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Item 4 (b) of the provisional agenda

METHODOLOGICAL ISSUES

GUIDELINES UNDER ARTICLES 5, 7 AND 8 OF THE KYOTO PROTOCOL

Pending parts of the guidelines under Articles 7 and 8

Note by the secretariat

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I. INTRODUCTION

A. Mandate

1. The Conference of the Parties (COP), in its decision 22/CP.7, requested the Subsidiary Body for Scientific and Technological Advice (SBSTA), at its sixteenth session, to elaborate further the sections on information on assigned amounts and information on national registries contained in the appendix to that decision. In so doing, the SBSTA should take into account the decision of the COP on modalities for the accounting of assigned amounts under Article 7, paragraph 4, of the Kyoto Protocol (decision 19/CP.7). The SBSTA should elaborate these sections with a view to recommending to the COP, at its eighth session, a decision incorporating these sections in the guidelines for the preparation of the information required under Article 7 (FCCC/CP/2001/13/Add.3, decision 22/CP.7, para. 3).
2. The COP, in its decision 23/CP.7, also requested the SBSTA, at its sixteenth session, to elaborate further part III (Review of information on assigned amounts) and part V (Review of national registries) of the guidelines for review under Article 8 of the Kyoto Protocol, as contained in appendix I to that decision, and any additional issues decided upon by the SBSTA. In so doing, the SBSTA should take into account the decision of the COP on modalities for the accounting of assigned amounts under Article 7, paragraph 4, of the Kyoto Protocol (decision 19/CP.7). The SBSTA should elaborate the above-mentioned sections with a view to recommending to the COP, at its eighth session, a decision incorporating these sections in the guidelines for review under Article 8 of the Kyoto Protocol (FCCC/CP/2001/13/Add.3, decision 23/CP.7, para. 13).

B. Background

3. During the negotiations leading up to the seventh session of the COP, it was recognized that the finalization of the guidelines under Articles 7 and 8 of the Kyoto Protocol depended on the outcome of the discussions on other provisions of the Kyoto Protocol, such as compliance, mechanisms, and modalities for the accounting of assigned amounts under Article 7, paragraph 4, of the Kyoto Protocol. The completion of the negotiations on some of these issues, such as compliance, prior to the close of the seventh session of the COP enabled the incorporation of relevant sections into the guidelines under Articles 7 and 8 reflecting the agreement of Parties on these issues. The negotiations on the modalities for the accounting of assigned amounts under Article 7, paragraph 4, of the Kyoto Protocol, however, came to a conclusion during the closing stages of the seventh session of the COP. Due to time limitations, it was not possible during this session to ensure consistency between the guidelines under Articles 7 and 8 and the modalities for the accounting of assigned amounts under Article 7, paragraph 4. For this reason, the COP decided to defer consideration of some parts of the guidelines under Articles 7 and 8 to its eighth session, as mentioned in paragraphs 1 and 2 above.

C. Scope of the note

4. In preparing for the sixteenth session of the SBSTA, the secretariat examined whether the pending sections of the guidelines under Articles 7 and 8¹ on reporting and review of assigned amount information and national registries, as contained in the appendices to decisions 22/CP.7 and 23/CP.7, are consistent with other decisions taken by the COP at its seventh session, in particular its decision 19/CP.7 on modalities for the accounting of assigned amounts under Article 7, paragraph 4. This document provides the results of this consistency check. The appendix to this document contains a proposal for a draft COP decision and the full revised text which could be incorporated into the text of the guidelines under Articles 7 and 8.

¹ Other pending parts of these guidelines, such as the review for the reinstatement of eligibility, are not included in this document.

D. Possible action by the SBSTA

5. Parties may wish to consider this information in their deliberations on the pending sections on reporting and review of assigned amount information and national registries of the guidelines under Articles 7 and 8 of the Kyoto Protocol, with a view to recommending a decision on this issue for adoption by the COP at its eighth session.

II. COMPARISON

6. Comparing the pending sections of the guidelines under Articles 7 and 8 of the Kyoto Protocol on reporting and review of assigned amount information and national registries (appendices to decisions 22/CP.7 and 23/CP.7, document FCCC/CP/2001/13/Add.3) with other decisions adopted by the COP at its seventh session, in particular its decision 19/CP.7 on modalities for the accounting of assigned amounts under Article 7, paragraph 4, it was found that only minor modifications have to be made to ensure overall consistency among different decisions. These changes are listed below.

7. Decision 22/CP.7, appendix, paragraph 1 (FCCC/CP/2001/13/Add.3): for consistency with the text of the modalities for the accounting of assigned amounts under Article 7, paragraph 4 (FCCC/CP/2001/13/Add.2, para. 47), add after subparagraph (b):

(c) *The total quantity of ERUs issued on the basis of Article 6 projects;*²

8. Decision 23/CP.7, Appendix I (FCCC/CP/2001/13/Add.3): for consistency with other parts of the guidelines for review under Article 8, replace paragraphs 2 and 3 by the following:

2. *The review of information on assigned amounts pursuant to Article 3, paragraphs 7 and 8, ERUs, CERs, AAUs and RMUs, shall take place in two parts:*

(a) *A thorough review of the calculation of assigned amounts pursuant to Article 3, paragraphs 7 and 8, as part of the review prior to the commitment period and its in-country visit;*

(b) *A desk or centralized review of the information reported in accordance with section I.E, "Information on emission reduction units, certified emission reductions, assigned amount units and removal units", of the guidelines for the preparation of information under Article 7 (decision 22/CP.7), conducted in conjunction with the annual inventory review.*³

9. Other minor changes of an editorial nature and relating to references to decisions are not listed here.

² The proposed changes can be found in page 5 of this document.

³ The proposed changes can be found in page 8 of this document.

Annex

Proposal of draft decision -/CP.8⁴

Additional sections to be incorporated in the guidelines for the preparation of the information required under Article 7, and in the guidelines for the review of information under Article 8, of the Kyoto Protocol

The Conference of the Parties,

Recalling its decisions 19/CP.7, 22/CP.7 and 23/CP.7,

Noting the relevant provisions of the Kyoto Protocol to the United Nations Framework Convention on Climate Change, in particular its Articles 7 and 8,

1. *Decides* to incorporate:

(a) In the guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol, the section on "Information on emission reduction units, certified emission reductions, assigned amount units and removal units", as contained in annex I to this decision;⁵

(b) In the guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol, the section on "National registries", as contained in annex I to this decision;⁶

(c) In the guidelines for review under Article 8 of the Kyoto Protocol, the section on "Review of information on assigned amounts pursuant to Article 3, paragraphs 7 and 8, emission reduction units, certified emission reductions, assigned amount units and removal units", as contained in annex II to this decision;⁷

(d) In the guidelines for review under Article 8 of the Kyoto Protocol, the section on "Review of national registries", as contained in annex II to this decision.⁸

2. *Recommends* that the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol, at its first session, adopt the annexes to this decision in conjunction with the draft decisions -/CMP.1 (Article 7) and -/CMP.1 (Article 8) in accordance with decisions 22/CP.7 and 23/CP.7.

⁴ This draft decision may have to be modified to include provisions for the incorporation of other outstanding parts of the guidelines, such as the review for the reinstatement of eligibility to use mechanisms.

⁵ This section will be incorporated in section "E. Information on emission reduction units, certified emission reductions, assigned amount units and removal units" (Decision, 22/CP.7, annex to the draft CMP decision on guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol, FCCC/CP/2001/13/Add.3).

⁶ This section will be incorporated in section "E. National Registries" (Decision, 22/CP.7, annex to the draft CMP decision on guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol, FCCC/CP/2001/13/Add.3).

⁷ This section will be incorporated in "Part III Review of information on assigned amounts pursuant to Article 3, paragraphs 7 and 8, emission reduction units, certified emission reductions, assigned amount units and removal units" (Decision 23/CP.7, annex to the draft CMP decision on guidelines for review under Article 8 of the Kyoto Protocol, FCCC/CP/2001/13/Add.3).

⁸ This section will be incorporated in "Part V: Review of National registries" (Decision 23/CP.7, Annex to the draft CMP decision on guidelines for review under Article 8 of the Kyoto Protocol, FCCC/CP/2001/13/Add.3).

ANNEX I

**I. REPORTING OF SUPPLEMENTARY INFORMATION UNDER
ARTICLE 7, PARAGRAPH 1****Information on emission reduction units, certified emission reductions,
assigned amount units and removal units**

1. Each Party included in Annex I with a commitment inscribed in Annex B to the Kyoto Protocol shall report, in a standard electronic format, the following information on emission reduction units (ERUs), certified emission reductions (CERs), assigned amount units (AAUs) and removal units (RMUs)⁹ from its national registry, for the previous calendar year (defined according to Greenwich Mean Time) distinguishing between units valid for different commitment periods:

- (a) The total quantity of ERUs, CERs, AAUs and RMUs in each account at the beginning of the year;
- (b) The total quantity of AAUs issued on the basis of the assigned amount pursuant to Article 3, paragraphs 7 and 8;
- (c) The total quantity of ERUs issued on the basis of Article 6 projects;
- (d) The total quantity of ERUs, CERs, AAUs and RMUs acquired from other registries and the identity of the transferring accounts and registries;
- (e) The total quantity of RMUs issued on the basis of each activity under Article 3, paragraphs 3 and 4;
- (f) The total quantity of ERUs, CERs, AAUs and RMUs transferred to other registries and the identity of the acquiring accounts and registries;
- (g) The total quantity of ERUs, CERs, AAUs and RMUs cancelled on the basis of activities under Article 3, paragraphs 3 and 4;
- (h) The total quantity of ERUs, CERs, AAUs and RMUs cancelled following determination by the Compliance Committee that the Party is not in compliance with its commitment under Article 3, paragraph 1;
- (i) The total quantity of other ERUs, CERs, AAUs and RMUs cancelled;
- (j) The total quantity of ERUs, CERs, AAUs and RMUs retired;
- (k) The total quantity of ERUs, CERs and AAUs carried over from the previous commitment period;
- (l) The total quantity of ERUs, CERs, AAUs and RMUs in each account at the end of the year.

2. Each Party included in Annex I shall report a calculation of its commitment period reserve at the end of the year calculated in accordance with the annex to decision -/CMP.1 (Article 17).

⁹ As defined in paragraphs 1-4 of the annex to decision -/CMP.1 (*Modalities for the accounting of assigned amounts under Article 7, paragraph 4*), as attached to decision 19/CP.7.

3. The information referred to in paragraph 1 above shall be consistent with the information which is publicly accessible through the national registry of the Party in accordance with paragraphs 44 and 47 of the modalities for the accounting of assigned amounts under Article 7, paragraph 4 (decision -/CMP.1 (*Modalities for the accounting of assigned amounts under Article 7, paragraph 4*)).

II. REPORTING OF SUPPLEMENTARY INFORMATION UNDER ARTICLE 7, PARAGRAPH 2

National registries

4. Each Party included in Annex I with a commitment inscribed in Annex B to the Kyoto Protocol shall provide a description of its national registry. The description shall include the following information:

- (a) The name and contact information of the registry administrator designated by the Party to maintain the national registry;
- (b) Any other Party with which the Party cooperates by maintaining their respective national registries in a consolidated system;
- (c) A description of the database structure used in the national registry;
- (d) A description of how the national registry conforms to the technical standards for the purpose of ensuring the accurate, transparent and efficient exchange of data between national registries, the clean development mechanism registry and the transaction log (decision 19/CP.7, paragraph 1), including:¹⁰
 - (i) A description of the formats used in the national registry for account numbers, serial numbers for ERUs, CERs, AAUs and RMUs, including project identifiers and transaction numbers;
 - (ii) A list, and the electronic format, of the information transmitted electronically when transferring ERUs, CERs, AAUs and/or RMUs to other registries;
 - (iii) A list, and the electronic format, of the information transmitted electronically when acquiring ERUs, CERs, AAUs and/or RMUs from other national registries or the CDM registry;
 - (iv) A list, and the electronic format, of the information transmitted electronically from the national registry to the independent transaction log when issuing, transferring, acquiring, cancelling and retiring ERUs, CERs, AAUs and/or RMUs;
 - (v) An explanation of the procedures employed in the national registry to prevent discrepancies in the issuance, transfer, acquisition, cancellation and retirement of ERUs, CERs, AAUs and/or RMUs;
 - (vi) An overview of security measures employed in the national registry to deter unauthorized manipulations and to minimize operator error;

¹⁰ As a consequence of the ongoing consideration of the technical standards by the SBSTA, additional information to that referred to in subparagraphs (i) – (vi) may need to be reported. This information, if any, may be incorporated in the corresponding decision by the COP when consideration of the technical standards has been completed.

(e) A list of the information publicly accessible by means of the user interface to the national registry;

(f) An explanation of how to access information by means of the user interface to the national registry.

ANNEX II

PART III: REVIEW OF INFORMATION ON ASSIGNED AMOUNTS PURSUANT TO ARTICLE 3, PARAGRAPHS 7 AND 8, EMISSION REDUCTION UNITS, CERTIFIED EMISSION REDUCTIONS, ASSIGNED AMOUNT UNITS AND REMOVAL UNITS

A. Purpose

1. The purpose of this review is to ensure that the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (COP/MOP) and the Compliance Committee have adequate information on assigned amounts pursuant to Article 3, paragraphs 7 and 8, ERUs, CERs, AAUs and RMUs.

B. General procedures

2. The review of information on assigned amounts pursuant to Article 3, paragraphs 7 and 8, ERUs, CERs, AAUs and RMUs, shall take place in two parts:

(a) A thorough review of the calculation of assigned amounts pursuant to Article 3, paragraphs 7 and 8, as part of the review prior to the commitment period and its in-country visit;

(b) A desk or centralized review of the information reported in accordance with section I.E, "Information on emission reduction units, certified emission reductions, assigned amount units and removal units", of the guidelines for the preparation of information under Article 7 (decision 22/CP.7), conducted in conjunction with the annual inventory review.

C. Scope of the review

3. The review of information on assigned amounts shall cover the calculation by each Party included in Annex I of its assigned amount pursuant to Article 3, paragraphs 7 and 8, and the information reported in accordance with section I.E, "Information on emission reduction units, certified emission reductions, assigned amount units and removal units", of the guidelines for the preparation of information under Article 7 (decision 22/CP.7).

1. Identification of problems

4. The expert review team shall:

(a) Check whether information is complete and submitted in accordance with section I of the guidelines for the preparation of information required under Article 7, and relevant decisions of the COP and the COP/MOP;

(b) Check that the assigned amount pursuant to Article 3, paragraphs 7 and 8, is calculated in accordance with the modalities for the accounting of assigned amounts under Article 7, paragraph 4, is consistent with reviewed and adjusted inventory estimates, is consistent with information submitted in previous years and is issued into the national registry in conformity with the modalities for the accounting of assigned amounts under Article 7, paragraph 4;

(c) Check that ERUs, CERs, AAUs and RMUs are issued and cancelled in accordance with the modalities for the accounting of assigned amounts under Article 7, paragraph 4, and are consistent with reviewed and adjusted inventory estimates;

(d) Cross-check the information on transfers and acquisitions, including for the purposes of cancelling and retiring, as well as on carry-overs to the subsequent commitment period, and highlight any discrepancies;

(e) Check that the required level of the commitment period reserve, as reported, is calculated in accordance with decision 18/CP.7;

(f) Check that the required level of the commitment period reserve has not been infringed upon at any time.

D. Timing

5. During the review, the expert review team shall identify problems and notify the Party of them. The Party included in Annex I may correct the problems or provide additional information within the time frame set out in the guidelines (paragraphs 72 to 78), contained in the annex to decision -/CMP.1 (Article 8).

E. Reporting

6. The following specific elements shall be included in the reports referred to in paragraph 46 (a) and (b) of the annex to decision -/CMP.1 (Article 8):

(a) Identification of problems according to the categories listed in paragraph 4 of this annex;

(b) For each problem, a quantitative indication of the magnitude of the part of the assigned amount affected by the problem expressed as a percentage of the assigned amount pursuant to Article 3, paragraphs 7 and 8.

PART V: REVIEW OF NATIONAL REGISTRIES

A. Purpose

7. The purpose of the review of national registries is:

(a) To provide a thorough and comprehensive technical assessment of the capacity of a national registry;

(b) To assess the extent to which the registry requirements contained in the modalities for the accounting of assigned amounts under Article 7, paragraph 4, have been adhered to and to assist Parties included in Annex I in meeting their commitments;

(c) To provide the COP/MOP and the Compliance Committee with reliable information on national registries.

B. General procedures

8. The review of national registries shall take place in two parts:

(a) A thorough review of the national registry, as part of the review prior to the commitment period and its in-country visit;

(b) A desk or centralized review of any reported changes in the national registry reported since the first thorough review, conducted in conjunction with the annual inventory review.

C. Scope of the review

1. In-country review

9. The expert review team shall conduct a thorough and comprehensive review of the national registry of each Party included in Annex I. The review of the national registry should cover the extent to which the registry requirements contained in the modalities for the accounting of assigned amounts under Article 7, paragraph 4, and the technical standards for the purpose of ensuring the accurate, transparent and efficient exchange of data between national registries, the clean development mechanism registry and the transaction log, have been adhered to.

2. Review of changes in the national registry

10. Any significant changes in the national registry reported by Parties included in Annex I, or identified by the expert review team during the in-country visit, which may affect the performance of the registry should be reviewed annually in conjunction with the annual inventory review.

3. Identification of problems

11. The expert review team shall, *inter alia*:

(a) Check whether information on national registries is complete and submitted in accordance with section I of the guidelines for the preparation of information required under Article 7, and with relevant decisions of the COP and the COP/MOP;

(b) Check whether the registry conforms to the technical standards for the purpose of ensuring accurate, transparent and efficient exchange of data between national registries, the clean development registry and the independent transaction log;

(c) Check whether the issuance and cancellation of units is in accordance with the modalities for the accounting of assigned amounts under Article 7, paragraph 4;

(d) Check whether the transaction procedures, including those relating to the transaction log, are in accordance with the modalities for the accounting of assigned amounts under Article 7, paragraph 4;

(e) Check the procedures to prevent discrepancies in the issuance, transfer, acquisition, cancellation and retirement of ERUs, CERs, AAUs and RMUs;

(f) Check the security measures to deter unauthorized manipulations and minimize operator error;

(g) Check that information is publicly available in accordance with the modalities for the accounting of assigned amounts under Article 7, paragraph 4.

D. Timing

12. During the process of the in-country visit, the expert review team shall list all the problems identified and shall notify the Party included in Annex I of the problems identified no later than six weeks after the visit. The Party included in Annex I shall comment on these problems within six weeks of the notification. The expert review team shall prepare a draft of a review report on the national registry within six weeks of the receipt of the comments on the questions posed. Any corrections,

additional information or comments on the draft report received from the Party included in Annex I within four weeks after the report has been sent to that Party shall be subject to review and shall be included in the final inventory review report. The expert review team shall prepare a final report on the review of the national registry within four weeks of the receipt of the comments on the draft report. The review of the national registry shall be concluded within one year of the date of submission of the information.

13. The review of changes in the national registry shall follow the timetable for the review of annual inventories defined in part II of these guidelines. If either the annual inventory review or the review of changes in the national registry recommends an in-depth review of the national registry, the inventory review of national registries should be conducted, together with the subsequent in-country review of either the annual inventory or the periodic national communication, whichever is the earlier.

E. Reporting

14. The following specific elements shall be included in the reports referred to in paragraph 46 (a) and (b) of the annex to decision -/CMP.1 (*Article 8*):

- (a) Identification of problems according to the categories listed in paragraph 11 above;
- (b) An evaluation of the overall functioning of the national registry.



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**THIRD ASSESSMENT REPORT OF THE
INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE**

Report of the workshop on the Third Assessment Report

Note by the secretariat

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I. INTRODUCTION

A. Mandate

1. The Conference of the Parties (COP), by its decision 25/CP.7, expressed its appreciation and gratitude to the Intergovernmental Panel on Climate Change (IPCC), particularly its Chairman and all its authors and scientists, for their excellent work in preparing the Third Assessment Report (TAR), and encouraged the IPCC to continue its work, including, *inter alia*, preparation of the Fourth Assessment Report. It also encouraged Parties to make full use of the information contained in the Third Assessment Report.

2. At its fifteenth session, the Subsidiary Body for Scientific and Technological Advice (SBSTA) requested the secretariat: (i) to organize, prior to the sixteenth session of the SBSTA, a workshop to explore the information contained in the TAR and how the content of the TAR can facilitate the work of the SBSTA and the other Convention bodies relating to climate change, research and systematic observation, scientific uncertainty, impacts of climate change and adaptation to climate change, effects of measures, innovative technology development, methodological issues, and other matters contained in the TAR, under the guidance of the Chairman of the SBSTA and with participation from experts identified by the IPCC; and (ii) to prepare a report on that workshop for consideration by the SBSTA at its sixteenth session (FCCC/SBSTA/2001/8, para. 12 (d)).

3. The SBSTA also invited Parties to provide their views for compilation in a miscellaneous document on: (i) the information contained in the TAR; and (ii) possible IPCC activities in support of the needs of the Convention and its Kyoto Protocol (FCCC/SBSTA/2001/8, para. 12 (c)). The SBSTA decided to consider, at its sixteenth session, the report on the workshop referred to above and the information contained in the submissions (FCCC/SBSTA/2001/8, para. 12 (e)).

B. Scope of the note

4. This report provides information on the workshop organized by the secretariat in response to the above mandate. Submissions from Parties are contained in document FCCC/SBSTA/2002/MISC.5.

C. Possible action by the SBSTA

5. The SBSTA may wish to take note of the information contained in this report, identify matters for further consideration and agree on further action. It may also wish to call relevant issues to the attention of the Subsidiary Body for Implementation (SBI).

II. PROCEEDINGS

6. The UNFCCC workshop on the IPCC Third Assessment Report was organized by the secretariat in Bonn, Germany, from 4 to 6 April 2002 with support from the Governments of Canada and Germany. Seventy-four participants took part in the workshop. The participants included 54 representatives from 39 Parties (including 23 participants from developing countries and countries with economies in transition), 12 experts identified by the IPCC and 8 representatives from international and non-governmental organizations. The agenda of the workshop is contained in annex I to this document. The workshop was chaired by the Chairman of the SBSTA, Mr. Halldor Thorgeirsson. Participants had available documents FCCC/SBSTA/2001/INF.6 on the Third Assessment Report of the IPCC and FCCC/SBSTA/2002/MISC.5.

7. Information contained in the TAR was considered under two general headings: "risk analysis" and "risk management". Two panel sessions were held on the first day. The panel on risk analysis considered aspects of the scientific basis of climate change from the IPCC Working Group I report, such

as changes in atmospheric chemistry, long-term emission scenarios, detection, attribution and prediction of climate change, and observing global climate variability and change. This panel also discussed the information on the impacts of climate change contained in the IPCC Working Group II report. The panel on risk management considered adaptation to climate change from the Working Group II report, and information on effects of mitigation measures and innovative technologies from the Working Group III report. Scientific uncertainty, methodologies and research were explored in the context of both risk analysis and risk management.

8. Mr. Robert Watson, Chairman of the IPCC, made an introductory presentation on the TAR and moderated discussions in each panel. IPCC experts presented a summary of TAR findings, associated uncertainties, methodological issues and needs for further research.¹ Several experts also commented on how information contained in the TAR could assist future work of the SBSTA. The presentations were followed by an exchange of views between representatives of the Parties, organizations and the IPCC experts.

9. On the second day the participants explored how the information in the TAR could facilitate the work of the SBSTA and other Convention bodies. Two short presentations by the UNFCCC secretariat provided an overview of the provisional agendas of the sixteenth sessions of the SBSTA and the SBI and highlighted some issues of relevance. These presentations were followed by a general discussion. Based on the discussions, a list of topics of relevance to the work of the SBSTA and other Convention bodies was drawn up (see annex II). The participants at the workshop explored only a small amount of the information contained in the TAR because of the limited time.

III. WORKSHOP SUMMARY

10. The Chairman noted the exploratory nature of the workshop and, following an initial exchange of views among the participants, identified a list of topics for further discussion that might facilitate the work of the SBSTA and other Convention bodies, including: issues related to the scientific basis of climate change, scientific uncertainty, research and systematic observation, impacts and adaptation, effects of measures, development of innovative technology, methodological issues, and other matters. Further consideration of the TAR by the SBSTA was also discussed.

11. The following summary outlines the main issues discussed and the wide variety of views expressed. It is not intended to be a comprehensive account of the views of all participants.

A. Climate change

12. The discussion under this general topic focused on the scientific issues related to the Convention, including its ultimate objective.

13. As explored at the workshop, the TAR provides new scientific information and evidence regarding, inter alia, future concentrations of greenhouse gases (GHGs) in the atmosphere, future climate change, biophysical and socio-economic impacts of climate change at different levels of GHG concentration, and the technical and economic potential for achieving different levels of GHG concentrations, which can contribute to defining "dangerous anthropogenic interference with the climate system". At the same time, the TAR indicates that such conclusions involve value judgements determined through socio-political processes. These value judgements are to be based on available scientific information, and should include such considerations as development, equity, sustainability, and

¹ Presentations made at the workshop by the IPCC experts can be found at <http://unfccc.int/sessions/workshop/040402/index.html>

local adaptive and mitigative capacities, as well as uncertainties and risk.² Participants expressed different views on whether the scientific information presented in the TAR is sufficient for making decisions on what constitutes "dangerous anthropogenic interference" with the climate system and underlined that all the elements of Article 2 of the Convention need to be considered together.

14. All participants agreed that further research is needed to improve understanding and reduce uncertainties on the matters related to the "dangerous anthropogenic interference" and "critical thresholds" of GHG concentration in the atmosphere. Research in the following areas was considered to be important: sensitivity of the climate system; climate forcing due to natural factors and anthropogenic aerosols; socio-economic and biophysical impacts; the critical thresholds of GHG concentration in the atmosphere; and the technological feasibility of preventing critical thresholds from being surpassed.

Possible future work of the SBSTA

15. Some participants suggested that, although some of the scientific information in the TAR is uncertain, it is sufficient to start a process of translating the scientific assessment into policy responses. It was suggested that the SBSTA should include a separate item in its agenda relating to the consideration of what constitutes "dangerous anthropogenic interference" and how to prevent it. It was noted that such a debate should include consideration of critical thresholds, criteria, and the timetable needed to avoid "dangerous anthropogenic interference". Other participants expressed the view that the scientific information in the TAR relating to the term "dangerous anthropogenic interference" is not robust enough to provide a sound basis for making judgements at a political level. They argued that such discussions in the SBSTA would not be productive, and that the subject requires further scientific study.

B. Scientific uncertainty

16. The participants exchanged views on the general topic of scientific uncertainty and also explored the issue of scientific uncertainty in the context of each topic. It was noted that some of the uncertainties identified in the TAR are associated with quantitative information on the magnitude and timing of climate changes and responses, especially at a regional level, rather than qualitative differences which would fundamentally change the conclusions drawn from the report. Participants also acknowledged that climate change policy decisions under general uncertainty are based on risk assessment. They noted the importance of exploring and identifying methodologies that can facilitate risk assessment and risk management, including both cost-benefit analysis of impacts and mitigation and other approaches to assess non-monetary criteria. Inherent limitations of cost-benefit analysis as a basis for climate change policy-making were also noted by participants.

17. Some participants also stressed the importance of considering findings which were identified as robust, referring to table SPM-3 of the Synthesis Report of the TAR, since these findings, in their view, represented a sound basis for further work of the SBSTA.

Possible future work of the SBSTA

18. Some participants suggested that the SBSTA should explore how to consider uncertainties and the robust findings in the TAR. They pointed out that work is needed to identify priority areas where reducing uncertainties are crucial for the policy-making process. An expert meeting to explore different aspects of the general issue of uncertainty was seen by some participants as a useful means to advance the issue under the SBSTA.

² For more information see *Climate change 2001. Synthesis report. Contribution of working groups I, II and III to the Third Assessment Report of the Intergovernmental Panel on Climate Change*, pp. 2-4 and pp. 37-43.

C. Research and systematic observation

19. Several participants noted that the SBSTA should be involved in coordinating research priorities and encouraging research relating to climate change science, taking into account the gaps identified in the TAR. Increase in funding of research programmes and improving local research capacities were viewed as critical for providing better information for decision-making in the future.

20. Participants also noted the importance of systematic observation and in particular, of a global climate observing system, for advancing scientific knowledge, assessing global and regional climate changes, and projecting the magnitude, timing and future effects of climate change. Some participants also suggested that consideration of additional funding to support observations might be needed. Others recalled decision 2/CP.4 and argued that the Global Environment Facility has been given the mandate to provide financial support to build capacity for participation in systematic observational networks to reduce scientific uncertainties in accordance with Article 5 of the Convention.

Possible future work of the SBSTA

21. Decision 5/CP.5 on research and systematic observation was recalled. Participants noted that the SBSTA should continue its efforts to encourage Parties to address deficiencies and strengthen observational networks in the global climate observing system, as well as to promote international cooperation (through the World Climate Research Programme and the Global Climate Observing System (GCOS)), particularly in developing countries. The importance of encouraging regional cooperation, and the exchange of data in accordance with Article 4 of the Convention was acknowledged in this regard.

D. Impacts and adaptation

22. It was noted that all emission scenarios studied in the TAR result in changes in climate. Adaptation is therefore no longer an option but a necessity. The participants further acknowledged that the TAR provides important information on impacts, vulnerability and adaptation, and methodological approaches for assessing the impacts of and vulnerability to climate change. Some participants noted the need to update the IPCC information on methods to assess climate change impacts and adaptation.

23. Participants stressed that vulnerability and adaptation assessments, the associated exchange of information and the ability to apply impact and adaptation methods are issues for all Parties, but are particularly important to developing countries at both regional and country level. They generally concurred with the findings in the TAR that the enhancement of capacities to adapt to current climate variability and extremes is necessary to reduce vulnerability in the long term, and that the socio-economic and technological characteristics of different development paths will affect the capacity to adapt. It was also emphasized that adaptation measures were likely to be successfully implemented if they were consistent with sustainable development goals.

24. Participants recalled the conclusion of the TAR that a combination of mitigation and adaptation could be needed to reduce adverse effects of climate change. They noted that strategies which enhance the capacity to mitigate should also be effective in enhancing the capacity to adapt. In this regard, there is a need to explore common strategies to mitigate and adapt with a goal of reducing costs and enhancing capacities.

Possible future work of the SBSTA

25. The participants recalled decision 5/CP.7 on implementation of Article 4.8 and 4.9 of the Convention, and the conclusions of the SBSTA on methods and tools to assess impacts and adaptation (FCCC/SBSTA/2001/8, para. 23). They noted that the SBSTA should continue addressing methods and tools to assess impacts and adaptation, and their dissemination, taking into account the TAR.

Participants expressed the view that the SBSTA should consider action to assist the scientific community in developing better risk-analysis and impact-assessment tools. Several participants noted that the SBSTA could encourage further action to enhance the exchange of information among all Parties relating to their current programmes to reduce vulnerability and adapt to climate variability and climate change.

26. Participants also suggested that the SBSTA could play an important role in formulating research priorities in the area of the assessment of climate change impacts, vulnerability and adaptation, interacting with the scientific community. The following scientific topics were mentioned as possible examples of such priorities: risk reduction under different development pathways and mitigation strategies; the implications of climate change in the context of other pressures on natural resources such as water management; impacts of climate change on human health; the likelihood of extreme events in the context of climate change and possible adaptation to the extremes; technologies to adapt to climate change and the cost of adaptation options; criteria for evaluation of adaptation and adaptive capacities.

E. Effects of measures

27. The participants noted that the IPCC had identified a set of criteria used by countries to identify and implement policies and measures. Environmental effectiveness was viewed as a very important criterion in developing national climate change strategies but it was also acknowledged that economic efficiency was at least equally important.

28. It was also noted that the TAR suggests that even measures which had the highest ranking as a result of cost-benefit analysis were not necessarily implemented due to a number of implementation barriers. Participants acknowledged the need for further work to find innovative approaches to reduce these barriers, taking into account the time delay between implementation of policies and the effects on emissions and on the climate. Participants noted that policies should aim to avoid economic and emission pathways that are difficult to change and which may be costly.

29. The participants noted that energy prices have a significant impact on emission trends, and the environmental effectiveness and economic efficiency of policies and measures. Further analysis of the effects of energy prices on measures and analysis of possible market distortions was seen as one of the priority issues for consideration by the IPCC.

30. Another theme of the discussion was the need for the countries to find the most appropriate portfolio of options and policies in their national strategies to mitigate climate change. It was recognized that an optimal portfolio of policies and measures is a country-specific matter, but that further work by the IPCC to define the concept of optimal portfolios could help countries in assessing policies and measures.

31. The spillover effects of national policies on other countries were also discussed. These could be positive or negative. The participants noted that decision 5/CP.7 provides a framework for additional work in the area of the adverse impacts of response measures.

Possible future work of the SBSTA

32. Gaps in the methodology to assess the effects of policies and measures, and in particular their cost and benefit were noted. In this context, a need for further sharing of methodological information in the framework of the SBSTA process was acknowledged by a number of participants as possible future action.

F. Innovative technology development

33. The participants stressed the importance of developing new mitigation and adaptation technologies in order to achieve the ultimate objective of the Convention. Participants also recalled

Article 4.5 of the Convention and related decision 4/CP.7, which provides a framework for implementing this article.

34. It was also noted that many options for government action were identified in the TAR. For example, it was noted that there are opportunities and barriers related to capital stock turnover and technological diffusion rates. The long lifetimes of operation of some technologies cause the stock of installed capacity to change slowly. Retiring technology before the end of its operational life increases costs, while on the other hand, installing the most efficient technologies may have multiple benefits. Additional studies and consideration of this issue are needed.

35. The access to technologies and intellectual property rights was mentioned as an issue of concern for many developing countries.

Possible future work of the SBSTA

36. Investment in research and development of technologies to mitigate and adapt to climate change was mentioned by a number of participants as a critical issue. Several participants suggested that the SBSTA may wish to investigate current investment patterns as a next step.

G. Methodological issues

37. Issues related to methodologies were explored under most of the above topics. Two additional issues were brought up by the participants under this heading. First, participants noted the new information provided in the TAR regarding new pollutants which affect the radiative balance, or "greenhouse agents".³ This information may provide a basis for consideration of whether the basket of gases listed in the Kyoto Protocol for the second commitment period should be expanded to include particulates, such as black carbon, and ozone precursors.

38. Another issue relates to the information contained in the TAR on updated global warming potentials for a number of GHGs. Some participants noted that the information may have implications for future mitigation strategies as well as for the UNFCCC reporting guidelines for GHG inventories, although some additional assessment of those possible implications may be necessary in order to make an informed decision.

Possible future work of the SBSTA

39. No specific suggestions for future work by the SBSTA on this matter were made at the workshop.

H. Other matters

40. Many participants touched upon the issue of public awareness and the issue of capacity-building as related to the IPCC. The conclusions of the SBSTA on the TAR (FCCC/SBSTA/2001/8, para. 12) and on Article 6 of the Convention: education, training and public awareness (FCCC/SBSTA/2001/8, para. 45) were recalled. In particular, participants highlighted the importance of disseminating the results of the TAR in the context of Article 6 of the Convention. The role of other international and United Nations organizations was emphasized in this regard.

41. The need to increase the number of developing country experts in all IPCC activities and to consider more scientific literature in languages other than English was acknowledged by the participants.

³ While term "greenhouse agents" was suggested by participants, the secretariat believes that the more appropriate scientific term is "forcing agents".

I. Consideration of the Third Assessment Report by the SBSTA

42. The workshop participants expressed a range of views related to further consideration of the TAR by the SBSTA.

43. Some participants noted that the TAR contains information with broad implications for the possible work of the SBSTA over the next few years. Therefore they considered it useful to have the TAR as a regular item on the agenda of the SBSTA with a work plan, which, inter alia, would aim to:

(a) Further consider implications of the TAR for the work of the SBSTA and other Convention bodies. It was noted that a number of the SBSTA (and possibly SBI) agenda items could be re-examined to better reflect related TAR findings, with the implication of changing the respective work plans. The SBSTA may wish to look for new items, for example those related to Article 2 of the Convention;

(b) Identify research issues and priorities for further research by the scientific community based on the analysis of uncertainties and research gaps in different areas;

(c) Identify key policy-relevant questions in advance of the IPCC Fourth Assessment Report. These questions should not prescribe the IPCC process, but rather provide guidance on what kind of information to look for in the literature assessments. This proposed activity was welcomed by the representatives and experts of the IPCC.

44. Some participants argued that consideration of policy implications arising from the TAR falls outside the mandate of the SBSTA. They suggested limiting consideration of the TAR to issues such as (a) scientific uncertainty of the assessments in the TAR; (b) issues related to technology transfer; and (c) issues relating to ways and means of supporting indigenous capacity-building in developing countries.

Annex I

WORKSHOP AGENDA

Day 1: Thursday, 4 April 2002

09.00 – 09.30 Registration

09.30 – 10.00 WELCOME, OPENING AND INTRODUCTION

Welcome

Mr. R. Kinley, UNFCCC secretariat

Objectives, focus and procedure of the workshop

Mr. H. Thorgeirsson, Chairman of the SBSTA

IPCC TAR – Introduction

Mr. R. Watson, Chairman of the IPCC

10.00 – 11.15 PANEL I. THE IPCC TAR ON “RISK ANALYSIS”
*Issues related to climate change, systematic observation,
impacts of climate change, including related uncertainties,
methodologies and research*

Moderator: Mr. R. Watson, Chairman of the IPCC

Panelists: Atmospheric chemistry: GHG and precursors
Mr. M. Prather, Coordinating Lead Author (CLA) of IPCC

Observing global climate variability and change

Mr. T. Karl, CLA of IPCC

Long-term GHG emission scenarios

Mr. N. Nakicenovic, CLA of IPCC

Climate change: attribution and scenarios

Mr. J.F.B. Mitchel, CLA of IPCC

Impact of climate change

Mr. M. Parry, CLA of IPCC, Mr. S. Cohen, CLA of IPCC

11.15 – 11.30 Coffee break

11.30 – 13.00 GENERAL DISCUSSION ON “RISK ANALYSIS”
*Statements/questions/exchange of views among the workshop
participants and the panel members*

13.00 – 14.30 Lunch

14.30 – 16.00 PANEL II. THE IPCC TAR ON "RISK MANAGEMENT"

Issues related to adaptation, the effect of measures, and innovative technology development, including related uncertainties, methodologies and research

Moderator: Mr. R. Watson, Chairman of the IPCC

Panelists: Adaptation to climate change
Mr. T. Downing, CLA of IPCC

Mitigation. Introduction
Mr. B. Metz, Co-Chair of WGIII IPCC TAR

Effects of measures
Mr. C. Jepma, Lead Author (LA) of IPCC and
Mr. J. Sathaye, CLA of IPCC

Innovative technology development
Mr. J. Moreira, CLA of IPCC;
Mr. R. Swart, Head of Technical Support Unit (TSU) WGIII of IPCC;
and Mr. N. Nakicenovic, CLA of IPCC

16.00 – 16.15 Coffee break

16.15 – 18.30 GENERAL DISCUSSION ON "RISK MANAGEMENT"

Statements/questions/exchange of views among the workshop participants and the panel members

19.00 Get-together. Canteen of Haus Carstanjen

Day 2: Friday, 5 April 2002

09.30 – 11.15 PLENARY SESSION

General discussion. How can the content of the TAR facilitate the work of the SBSTA and other Convention bodies?

Overview of the agenda of the sixteenth session of the SBSTA.
Some issues of relevance
Ms. H. Hoffmann, UNFCCC secretariat

Overview of the agenda of the sixteenth session of the SBI.
Some issues of relevance
Mr. V. Matsarski, UNFCCC secretariat

Discussion

11.15 – 11.30 Coffee break

11.30 – 19.00 PLENARY SESSION (continued)

How can the content of the TAR facilitate the work of the SBSTA and other Convention bodies?

Discussion

Day 3: Saturday, 6 April 2002

08.30 – 13.00 PLENARY SESSION (continued)

How can the content of the TAR facilitate the work of the SBSTA and other Convention bodies?

Discussion

Concluding remarks

Annex II**TOPICS OF RELEVANCE TO THE WORK OF THE SBSTA AND OTHER CONVENTION
BODIES IDENTIFIED AT THE WORKSHOP*****Issues related to the scientific basis of climate change***

- Ultimate objective of the Convention – scientific basis
- Critical thresholds of GHG concentration in the atmosphere

Scientific uncertainty

- Addressing key uncertainties and robust findings of the TAR
- Risk implications
- Regional dimensions
- Sequential decision-making in the face of uncertainties

Research and systematic observation

- Funding of research
- Coordination of research
- Strengthening of observation networks
- Regional focus
- Data exchange

Impacts and adaptation

- Linkage to decision 5/CP.7 and work on methods and tools of the SBSTA
- Regional and national analysis
- Likelihood of extreme events
- Increased focus on adaptation measures
- Costing of impacts and adaptation options
- Importance of development paths
- Implication on natural resource and water management
- Methodologies and tools for impacts and adaptation analysis

Effects of measures

- Sustainable development context (link to Article 2)
- Benefits of mitigation measures
- Cost of mitigation measures
- Spillover effect of response measures
- Effectiveness of measures to implement Kyoto Protocol
- Options to overcome barriers to implementation
- Time frame for changes in technologies
- Development of national strategies
- Market distortions

- Link to national communications

Innovative technology development

- Research and development investment
- Capital stocks turnover and technology diffusion rate
- Link to decision 4/CP.7 Framework for implementation of Article 4.5 of the Convention
- Access to technologies and intellectual property rights
- Adaptation technology development
- Technology potential in the context of Article 2
- Stimulation of innovation

Methodological issues

- Radiative forcing of gases and aerosols not covered by the Kyoto Protocol
- Updated global warming potentials

Other matters

- Link to Article 6 of the Convention: education, training and public awareness
 - Capacity-building
-



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Sixteenth session
Bonn, 5-14 June 2002
Item 4 (b) of the provisional agenda

METHODOLOGICAL ISSUES

GUIDELINES UNDER ARTICLES 5, 7 AND 8 OF THE KYOTO PROTOCOL

Report of a workshop to elaborate draft technical guidance on adjustments under Article 5.2 of the Kyoto Protocol

Note by the secretariat

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I. INTRODUCTION

A. Mandate

1. The Conference of the Parties (COP), in its decision 21/CP.7, requested the secretariat to organize a workshop prior to, and possibly one or more workshops after, the sixteenth session of the Subsidiary Body for Scientific and Technological Advice (SBSTA) on methodologies for adjustments under Article 5, paragraph 2, of the Kyoto Protocol with the participation of greenhouse gas (GHG) inventory experts and other experts nominated to the UNFCCC roster of experts and experts involved in the preparation of the Intergovernmental Panel on Climate Change (IPCC) report entitled "Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories" (hereinafter referred to as the IPCC good practice guidance). The purpose of the first workshop would be to elaborate draft technical guidance on methodologies for adjustments under Article 5, paragraph 2, building upon submissions by Parties contained in documents FCCC/SBSTA/2000/MISC.1 and Add.1, FCCC/SBSTA/2000/MISC.7 and Add.1-2, as well as FCCC/TP/2000/1, for consideration by the SBSTA at its sixteenth session. At that session, the SBSTA should define more precisely the scope of the second workshop (FCCC/CP/2001/13/Add.3).

2. By that same decision, the COP requested the SBSTA to complete technical guidance on methodologies for adjustments under Article 5, paragraph 2, of the Kyoto Protocol, building upon its draft decision on adjustments and the outcome of the process described in paragraph 1 above, for consideration by the COP at its ninth session, with a view to recommending, at that session, such technical guidance for adoption by the Conference of the Parties serving as the meeting of the Parties (COP/MOP) to the Kyoto Protocol at its first session.

B. Scope of the note

3. The purpose of this note is to report on the results of the workshop organized prior to the sixteenth session of the SBSTA in response to the mandate described in paragraph 1 above. The draft technical guidance on methodologies for adjustments under Article 5, paragraph 2, elaborated at the workshop following the mandate of decision 21/CP.7 is included as an annex to this note.

C. Possible action by the SBSTA

4. The SBSTA may wish to consider the information contained in this note and its annex. It may also wish to endorse or modify the conclusions reached by the participants in the workshop, including the approach for further work.

II. PROCEEDINGS

5. The workshop was held in Athens, Greece, from 3 to 5 April 2002, with the financial support of Canada and Norway and the logistical support of Greece, which hosted the workshop. It was organized by the UNFCCC secretariat in close cooperation with the Government of Greece through the National Observatory of Athens. The agenda of the workshop can be found on the secretariat's web site (<http://unfccc.int/sessions/workshop/030402/index.html>).¹

6. Forty-seven national experts, mainly GHG inventory experts, from 34 Parties participated in the workshop. Seventeen experts were funded, out of whom 13 were from Parties not included in Annex I to the Convention² and four were from Parties included in Annex I to the Convention (Annex I Parties) with economies in transition. All the experts had previously participated in one or more of the following

¹ All documents referenced in this note which have been posted on the secretariat's web site can be found at this location.

² Two invited experts from non-Annex I Parties were not able to attend the workshop.

activities: development of the IPCC good practice guidance, the technical review of Annex I Parties' GHG inventories,³ and negotiations on guidelines under Articles 5, 7 and 8 of the Kyoto Protocol. In addition, experts from two intergovernmental organizations, including the IPCC, and from two non-governmental organizations participated in the workshop. The list of participants can be found on the web site of the secretariat.

7. The workshop was co-chaired by Mr. Newton Paciornik (Brazil) and Mr. Audun Rosland (Norway), who accepted the invitation of the Chairman of the SBSTA, Mr. Halldor Thorgeirsson (Iceland), to conduct this task in his absence. The workshop was officially opened with the reading of a note from the Chairman of the SBSTA,⁴ and a welcome address by Mr. Dimitris Lalas, Director of the National Observatory of Athens.

8. The opening note by the Chairman provided guidance to the participants relating to the mandate and objective of the workshop and highlighted the methodological and technical character of the work entailed in the elaboration of the draft technical guidance on methodologies for adjustments.

9. The participants had before them the following two working papers,⁵ which had been prepared by the secretariat under the guidance of the chairman of the SBSTA and the assistance of the co-chairmen of the workshop:

(a) Working paper 1 (2002), which provides an overview of the history of the process on adjustments under Article 5, paragraph 2, as well as a compilation of all decisions of the COP and conclusions of the SBSTA on this matter; and

(b) Working paper 2 (2002), which compiles elements and a proposed structure for a draft technical guidance on methodologies for adjustments under Article 5, paragraph 2. This draft guidance builds upon decision 21/CP.7 (Good practice guidance and adjustments under Article 5, paragraph 2 of the Kyoto Protocol) and relevant provisions of decisions 22/CP.7 (Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol) and 23/CP.7 (Guidelines for review under Article 8 of the Kyoto Protocol) (see FCCC/CP/2001/13/Add.3) and the various documents that had been discussed previously in this context, in particular those mentioned in paragraph 1 above.⁶ The experience gained during the trial period of the technical review of GHG inventories of Annex I Parties has also been incorporated.

10. The workshop's deliberations were conducted mainly in plenary sessions, but also through four sectoral working groups according to the IPCC sectors energy, industrial processes, agriculture and waste.⁷ The work of each of the sectoral working groups was conducted with the assistance of two

³ The technical review of GHG inventories from Annex I Parties as established by decision 6/CP.5 (see document FCCC/CP/1999/7).

⁴ The Chairman of the SBSTA was unable to attend the workshop as he was chairing another SBSTA workshop to explore the information contained in the Third Assessment Report of the IPCC, held in Bonn, 4-6 April 2002. The note by the Chairman on the present workshop can be found on the secretariat's web site (<http://unfccc.int/sessions/workshop/030402/index.html>).

⁵ The working papers and the presentations made by the secretariat can be found on the secretariat's website (<http://unfccc.int/sessions/workshop/030402/index.html>).

⁶ In addition to the documents mentioned in paragraph 1 above, namely FCCC/SBSTA/2000/MISC.1 and Add.1, FCCC/SBSTA/2000/MISC.7 and Add.1-2, and FCCC/TP/2000/1, the secretariat used the following documents in compiling the elements and proposed structure for a draft technical guidance contained in working paper 2 (2002): FCCC/SBSTA/2000/INF.5/Add.2 and working paper 3 (a) to (g) (2000), which can be found on the secretariat's web site (<http://unfccc.int/sessions/workshop/030402/index.html>).

⁷ According to decision 21/CP.7, technical guidance on methodologies for adjustments under Article 5, paragraph 2, for estimates of anthropogenic emissions and removals from land use, land-use change and forestry,

co-facilitators, namely Ms. Kristin Rypdal (Norway) and Mr. Samir Amous (Tunisia) in energy, Mr. Manfred Ritter (Austria) and Mr. William Kojo Agyemang-Bonsu (Ghana) in industrial processes, Mr. Jim Penman (United Kingdom of Great Britain and Northern Ireland) and Mr. Eduardo Calvo (Peru) in agriculture, and Ms. Katarina Mareckova (Slovakia) and Mr. Art Jaques (Canada) in the waste sector.

11. Deliberations in the plenary sessions focused on the elements and proposed structure for a draft technical guidance on methodologies for adjustments, the objective and general approach of such methodologies, including the description of generally applicable methods, and methodological approaches to ensure that the adjusted estimates are conservative. In their elaboration of the draft technical guidance, participants gave full consideration to the procedures for calculation, application and reporting of adjustments as established under the provisions of the guidelines for review under Article 8 of the Kyoto Protocol.

12. The purpose of the sectoral working groups was to compile, where appropriate, guidance specific to each source category on methods for calculating adjustments. During these sectoral group sessions, participants were asked to identify, for each of the source-categories of the respective sector:

- (a) Those methodologies, including possible drivers, which are applicable for making adjustments and, where appropriate, those which may be most suitable, and
- (b) Elements to be used to ensure that the adjusted estimates are conservative.

In addition, each group identified areas in which further work to improve the technical guidance on adjustments of a given sector and its application would be needed. Upon completion of the workshop, the recommendations of each sectoral working group, as discussed during the last plenary session of the workshop, were incorporated by the secretariat, under the guidance of the co-chairmen assisted by the co-facilitators, into the draft technical guidance included in the annex to this note.

III. CONCLUSIONS

13. The participants endorsed the draft technical guidance on methodologies for adjustments as elaborated during the workshop. They recommended its consideration, endorsement and completion, if needed, by the SBSTA at its eighteenth session for consideration by the COP at its ninth session, with a view to recommending such technical guidance for adoption at that session by the COP/MOP, as mandated by decision 21/CP.7.

14. The participants recommended simulating the calculation of adjustments by using the methods included in the draft technical guidance on the basis of actual inventory data submitted by Parties in the years 2000 and 2001 and reviewed during the technical review of GHG inventories. This would allow the preparation and assessment of case studies using actual inventory data, which the participants suggested be undertaken by the secretariat. The results from these studies, including their assessment, might contribute to a further refinement of the draft technical guidance to be forwarded by the SBSTA⁸ for consideration by the COP at its ninth session.

15. The participants recommended that the secretariat should organize a second workshop, in keeping with the mandate of decision 21/CP.7 (see paragraph 1 above), on methodologies for adjustments under Article 5, paragraph 2, to take place in the first quarter of the year 2003. The purpose of that workshop would be an assessment by the inventory experts and experts participating in the workshop of the case studies of simulated adjustments as described in paragraph 14 above.

should be developed immediately after completion of the work of the IPCC on good practice guidance on land use, land-use change and forestry.

⁸ It is envisaged that consideration of this matter by the SBSTA will take place at its eighteenth session.

16. The participants anticipated that the assessment described in paragraphs 14 and 15 above would not lead to substantial changes in the draft technical guidance elaborated at the Athens workshop and contained in the annex to this note. It is likely that the results of the assessment will help to ensure a more consistent application of adjustments by the different expert review teams. However, if the results of the assessment indicate that some methods in the draft technical guidance do not lead to the adjustments as envisaged in the draft CMP.1 decision attached to decision 21/CP.7, or that the adjusted estimates do not seem to be appropriate, the process as envisaged would allow final corrections to be made to the draft technical guidance, including to the methods described therein, in order to ensure that adjustments would be calculated appropriately. The experts participating at the second workshop may recommend such corrections for consideration by the SBSTA at its eighteenth session.

17. In addition, participants identified a number of areas for future work that might also be undertaken by national inventory experts prior to the second workshop, namely: the creation of a basis for "clustering" of GHG estimates or other relevant data from countries with similar national circumstances, the compilation of sector-specific information on how to use interpolation/extrapolation methods in some sectors and how these methods result in conservative estimates, the identification of relevant data in international literature, the identification of appropriate drivers, for example for F-gases in the industrial processes sector and for biomass used as energy, and the development of further work on the application of the reference approach as an adjustment method for the fuel combustion subsector (taking into account that a missing CO₂ estimate for the whole fuel combustion sector is unlikely). The participants suggested that the outcome of such work should be shared with experts from other Parties.

Annex**DRAFT TECHNICAL GUIDANCE ON METHODOLOGIES FOR ADJUSTMENTS UNDER
ARTICLE 5, PARAGRAPH 2, OF THE KYOTO PROTOCOL⁹****I. OBJECTIVE**

1. The objective of this technical guidance on methodologies for adjustments under Article 5, paragraph 2, is to ensure that adjustments are applied consistently,¹⁰ comparably and transparently, and that similar methods are used for similar problems as far as possible across all inventories reviewed under Article 8.
2. The application of the adjustments is guided by the operative paragraphs 3 to 11 of the draft decision -/CMP.1 (Good practice guidance and adjustments under Article 5, paragraph 2), included in decision 21/CP.7.¹¹

II. GENERAL APPROACH

3. The expert review teams, under their collective responsibility, shall, if needed, calculate and document adjustments as part of the individual review reports, following this technical guidance.
4. Adjustments are intended to correct inventory problems for the purpose of accounting emission inventories and assigned amounts of the Parties included in Annex I to the Convention (Annex I Parties), in accordance with paragraphs 8 and 9 of the draft decision -/CMP.1 (Good practice guidance and adjustments under Article 5, paragraph 2). If the expert review team finds that an estimate is not prepared in accordance with the Intergovernmental Panel on Climate Change (IPCC) Guidelines¹² as elaborated by the IPCC good practice guidance,¹³ but evidently does not lead to an overestimation of emissions in the base year or an underestimation in a year of the commitment period, the estimate does not have to be adjusted.
5. Adjusted estimates should be conservative for the Party concerned in order to ensure that, for the base year(s), emissions¹⁴ are not overestimated and removals are not underestimated and, for a year of the commitment period, emissions are not underestimated and removals are not overestimated.
6. This guidance is not comprehensive and may not cover all possible problems. If some aspects of a particular case are not covered by this guidance, the experts calculating the adjustment shall adhere to paragraphs 3 to 11 of the draft decision -/CMP.1 (Good practice guidance and adjustments under Article 5, paragraph 2) and, as closely as possible, to this guidance.

⁹ All articles referred to in this guidance are those of the Kyoto Protocol. For the sake of brevity, the Kyoto Protocol is not specified after each article.

¹⁰ The need to ensure that adjustments are conservative as stated in the CMP decision on this matter (see paragraph 5 of the draft decision -/CMP.1 (Good practice guidance and adjustments under Article 5, paragraph 2)), could result in inconsistency in the time series between the base year and the commitment period.

¹¹ See FCCC/CP/2001/13/Add.3.

¹² For the purpose of this document, the term *IPCC Guidelines* denotes the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories.

¹³ For the purpose of this document, the term *IPCC good practice guidance* denotes the IPCC Report on Good Practice Guidance and Management of Uncertainty in National Greenhouse Gas Inventories.

¹⁴ For the purpose of this document, estimates of anthropogenic emissions by sources and removals by sinks of all greenhouse gases (GHGs) not controlled by the Montreal Protocol are referred to as emissions and removals, respectively.

7. The expert review teams should strive to apply a simple approach, given the limited time available for the calculation of adjustments.¹⁵ Accordingly, the expert review teams may use country-specific data available from other sources, giving preference to the consideration of data coming from national statistics, but they should avoid generating new country-specific data, for example by conducting surveys.

III. METHODS

A. Choice of methods and parameters

8. If the problem concerns only one inventory year (e.g. calculation mistake for a single year) and one component of a given estimate (such as inconsistent, incorrect or misapplied emission factors, activity data or model parameters), only this year or component should be replaced in order to adjust the emission estimate.

9. Expert review teams should decide which methods and parameters are appropriate for a specific case based on this guidance. The experts should follow the general recommendations given in this section, unless otherwise indicated in the sector-specific guidance in section IV. In following these recommendations it is necessary to be aware that the order in which methods are presented (see paragraphs 12–17 and table 1 below) does not represent a ranking of the methods to be used.

10. The decision on the method shall take into account:

(a) The availability of country-specific data in the source category at the respective level of aggregation that is required by the methods. Collection of new country-specific data by the experts should be avoided;

(b) The uncertainties of the available data;

(c) Relevant national circumstances affecting emissions or removals in the respective source category

(d) The sector-specific guidance in section IV as indicated in paragraph 9 above

11. If for any given year of the time series an estimate was missing or not prepared in a way consistent with the IPCC Guidelines as elaborated by the IPCC good practice guidance, thus resulting in an inconsistency in the submitted time series of a given source category, only those estimates, or the components of them, which lead to the discontinuity should be adjusted. If the same problem occurs in more than one year, all of the adjusted estimates should be conservative.

12. If an emission estimate is missing, the methods listed below may be applied:

(a) Interpolation, if an estimate is available and reviewed for both prior and subsequent years (see method A below)

(b) Extrapolation, if an estimate is available and reviewed for subsequent or previous years (see method B below)

(c) Application of IPCC tier 1 and/or default methods, if such a method, default emission factor or other necessary data are available (see method G below)

(d) Extrapolation using an appropriate driver (see method C below)

¹⁵ For provisions regarding timing under the review under Article 8, see paragraph 3 of the appendix to this guidance.

(e) Emission estimation using an average emission rate of a cluster of Annex I Parties and a country-specific driver (see method H below)

(f) Linkages of emissions between gases or sources (see method I below)

These methods would also be applied in those cases in which adjustments were triggered as a result of lack of transparency, if this lack of transparency precludes the expert review team from assessing whether the estimate is an overestimation of emissions in the base year or an underestimation of emissions in the years of the commitment period.

13. To replace an emission factor or other parameter that was calculated in a way not compatible with the IPCC Guidelines as elaborated by the IPCC good practice guidance, the following methods could be used:

(a) Interpolation, if a parameter is available and reviewed for both prior and subsequent years (see method A below)

(b) Extrapolation, if a parameter is available and reviewed for subsequent years or previous years (see method B below)

(c) Application of the IPCC default values or a conservative choice within the range given by the IPCC Guidelines (see method E below)

(d) Application of an average parameter for a cluster of countries with comparable national circumstances (see method F below)

(e) Application of values given in other recognized sources, such as international databases¹⁶ (see method D below), or

(f) Application of values from a cluster of countries with similar national circumstances (see method H below)

14. To replace activity data that were not collected in a way compatible with the IPCC Guidelines as elaborated by the IPCC good practice guidance, the following methods could be applied:

(a) Interpolation, if data are available and reviewed for both prior and subsequent years (see method A below)

(b) Extrapolation, if data are available and reviewed for subsequent or previous years (see method B below)

(c) Application of data from recognized national or international sources, such as international databases (see method D below)

15. To adjust estimates that were calculated using a method not compatible with the IPCC Guidelines as elaborated by the IPCC good practice guidance, or where a method is applied incorrectly, the following methods could be used:

(a) Application of IPCC tier 1 and/or default methods, if an IPCC tier 1 method, a default emission factor, activity data from national or international sources, or other necessary data are available (see method G below)

¹⁶ The IPCC emission factor database is under development.

(b) Emission estimation using an average emission rate of a cluster of Annex I Parties and a country-specific driver (see method H below)

(c) Linkages of emissions between gases or sources, if applicable (see method I below)

16. Problems of the allocation of emissions to the wrong source category should be addressed by the reallocation of these emissions to the correct source category. In this case, adjustments should be applied only if such reallocation affects total emissions of sources included in Annex A of the Kyoto Protocol or removes double counting of removals.¹⁷

17. For lack of full coverage of sub-sources within a source category, or lack of full geographic coverage, the same methods that are recommended for a missing estimate should be applied (see paragraph 12).

Table 1. Summary of the main reasons and available methods for adjustments¹⁸

Methods	Missing estimate ^(a)	Not prepared in accordance with the IPCC guidelines as elaborated by the IPCC good practice guidance			
		Emission factor or other parameter inappropriate	Activity data inappropriate	Method inappropriate	Allocation to inappropriate source category
A. Interpolation of emission estimates or parameters	X	X	X		
B. Extrapolation of emission estimates or parameters	X	X	X		
C. Extrapolation of emissions using drivers or surrogate data	X				
D. Application of data from international databases		X	X		
E. Application of IPCC default values		X			
F. Application of an average parameter for a cluster of countries		X			
G. Application of IPCC tier 1 and/or default methods	X			X	
H. Emission estimation using an average emission rate for a cluster of Annex I Parties and a country-specific driver	X	X		X	
I. Linkages of emissions between gases or source categories	X			X	
J. Reallocation of the emissions to the correct source category					X

^(a) The same methods apply to lack of full geographic coverage.

B. Further details on the general methods

18. In the following section, the requirements for application of the methods mentioned in the above section are further described:

¹⁷ If such reallocation does not affect total emissions of sources included in Annex A of the Kyoto Protocol, reallocation is recommended to the Party, but no adjustment is necessary.

¹⁸ The table summarizes generally applicable methods as specified in paragraphs 12 to 17. "X" indicates those methods that would be applicable for a given problem to be adjusted. In the sector-specific guidance, however, some methods not marked in this table were identified as applicable (see section IV).

A. Interpolation of emission estimates or parameters is applicable where reviewed values of the years adjacent to the year in question are available. Guidance on interpolation as provided in the IPCC good practice guidance, section 7.3.2.2, should be followed if interpolation is used.

B. Extrapolation of emission estimates or parameters is applicable if inventory data are missing for the beginning (base year) and/or the end (most recent year) of the time series, and reviewed values are available for some years. The experts should thoroughly analyse data for available years to determine the functional form of the extrapolation chosen, and report the number of existing values considered to derive the extrapolated estimate, as well as year-to-year fluctuations in previous years and the assumptions made in calculating the extrapolation. Guidance on trend extrapolation provided in the IPCC good practice guidance, section 7.3.2.2, should be followed if this method is used.

C. Extrapolation of emissions using drivers or surrogate data can be applied if emission estimates for the source category are available for the Party for some years but are missing for the required year. The emissions need to be strongly correlated with other well-known and more readily available indicative data. Experts shall demonstrate and report the significance of the relationship of the drivers used to calculate a missing estimate, including the year-to-year fluctuations, and shall report the assumptions made to calculate the extrapolation. Guidance on surrogate methods provided in the IPCC good practice guidance, section 7.3.2.2, should be followed if this method is used.

D. Application of data from international databases could be used to replace activity data or other parameters. If international data are used, the exact source and the date of retrieval should be reported. Whether or not the geographical coverage of the database corresponds to the country's geographical definition used for reporting under the UNFCCC should be checked. A brief description of how the international source collects its data, which definitions are used and how this data compares with any data directly provided by the Party should be provided by the expert review team. Sources of such data for the different sectors are listed in section IV.

E. Application of IPCC default values or a conservative choice within the range provided by the IPCC could be used to replace a deficient emission factor. For the default emission factors, the IPCC good practice guidance should always be consulted before the IPCC Guidelines. If a factor is chosen, the experts should report how the chosen default emission factor reflects national circumstances in a conservative manner.

F. Application of an average parameter for a cluster of countries with comparable national circumstances for a given source category could be used to correct a deficient parameter of the Party in question. Comparable national circumstances could relate to, *inter alia*, design, operation or management practices, types of oil and gas activity, or the age of equipment or installations and their technical features. Assumptions made for the composition of the cluster should be reported, as well as how this average parameter compares with the default parameter or range provided in the IPCC Guidelines. Such clusters should include only Annex I Parties that have undergone review and for which no adjustments were applied to the parameter concerned.

G. IPCC tier 1 and/or default methods could be applied if an emission estimate is missing entirely. For such estimation, recognized national or international activity data and IPCC default emission factors are to be used. For these methods, the IPCC good practice guidance should always be consulted before the IPCC Guidelines. IPCC tier 1 methods should be applied if reliable activity data for these methods are available and if a default emission factor is available reflecting in a conservative manner the national circumstances of the Party concerned. All assumptions made in calculating emissions using IPCC tier 1 methods should be reported.

H. Emission estimation using an average emission rate of a cluster of Annex I Parties and a country-specific driver can be used if an emission estimate is missing entirely but data for a parameter driving emissions from that source are available for the country in question. The estimate is derived by establishing a relationship between emissions and an appropriate driver for the cluster of countries with comparable national circumstances, and applying this relationship to the Party in question. Such clusters should include only Annex I Parties that have undergone review and for which no adjustments were applied to the parameter concerned. Comparable national circumstances for the source category concerned could, for example, relate to design, operation or management practices, types of oil and gas activity, or the age of equipment or installations and their technical features. Assumptions made for the composition of the cluster and the established relationship should be reported.

I. Linkages of emissions between gases or source categories could in some cases be used to estimate emissions from a specific gas or source category. For example, CH₄ and N₂O emissions for fuel combustion activities could be calculated from CO₂ emissions, if available. When this approach is used, the experts should carefully assess whether such a relationship between gases exists for the source category concerned. Examples are given in section IV.

J. Reallocation of emissions to the correct source category can be used when a wrong allocation of a given source category affects total emissions of sources included in Annex A of the Kyoto Protocol or removes double counting of removals.¹⁹

C. Other matters

1. Conservative approach

(see also examples in appendix I)

19. The selection of methods, activity data, emission factors or any other parameter, as appropriate, relevant to the estimation of adjustments to GHG emissions, should produce conservative estimates. These conservative estimates are produced taking into consideration that adjustments are likely to be applied on an exceptional basis²⁰ and are likely to have a temporary character.²¹

20. To ensure that emission estimates are conservative as defined in paragraph 5 above, the final adjusted estimate should be (for emissions in the base year or removals in a year of the commitment period) in general in the 25th percentile and (for removals in the base year or emissions in a year of the commitment period) in the 75th percentile of the 'possible range'. Such 'possible range' could be approximated by assessing:

- (a) The range of emission estimates obtained using the range of one or several input parameters; in particular those provided by the IPCC good practice guidance;
- (b) The range of emission estimates obtained using different methods; or
- (c) The range of uncertainty around a point estimate from uncertainty data available from other Annex I Parties.

¹⁹ If such reallocation does not affect total emissions of sources included in Annex A of the Kyoto Protocol, reallocation is recommended to the Party, but no adjustment is necessary.

²⁰ In accordance with paragraphs 74 and 80 (b) of the guidelines for review under Article 8, Parties might provide revised estimates for any inventory problem that the expert review team indicates needed adjustment.

²¹ In accordance with paragraphs 81 and 82 of the guidelines for review under Article 8, a Party has the opportunity to provide a revised estimate for a part of its inventory for a year of the commitment period in order to substitute an adjustment estimate.

21. Expert review teams may also make conservative point estimates based on conservative parameters. In selecting conservative parameters for this purpose, expert review teams should aim to produce final adjusted estimates for the base year and commitment period consistent with the provisions and percentile ranges set out in paragraphs 19 and 20 above.

22. The experts should provide evidence in specific cases for why the chosen adjustment is seen as conservative.

2. Procedures

23. When calculating adjustments in the context of the review under Article 8, if necessary, expert review teams shall follow the relevant provisions of the guidelines under Article 8.²²

3. Reporting

24. When reporting on adjustments in the context of the review under Article 8, expert review teams shall follow the relevant provisions of the guidelines under Article 8.²³

4. Archiving

25. The secretariat shall archive all information relating to adjustments and make it available to all expert review teams to enable them to apply adjustments, if needed, consistently across countries.

IV. SECTOR-SPECIFIC GUIDANCE

A. Energy: 1.A Fuel combustion activities

1. General characteristics of the subsector

26. Emission estimates from fuel combustion activities are based on national energy statistics. There are generally two approaches for estimating emissions due to fuel combustion activities. The reference approach calculates the total CO₂ emissions from the combustion activities of all fuels used. This approach estimates apparent consumption of fuels in the country on the basis of figures for production of primary fuels and imports, exports and stock changes of all fuels. In the sector-specific approach, emissions are calculated for each specific source category on the basis of fuel consumption in that given source category. In the case where data are not available at sector level, internationally available energy data can be used to calculate sector-specific emissions.²⁴ While the sector-specific approach generally provides more accurate sector emissions, it may not contain estimates for all sectors.

27. Only emissions from domestic shipping and air transport are included in the total national emissions. Often it can be difficult to distinguish the domestic activities from the international ones. The IPCC good practice guidance gives guidance as to how the split between the domestic and international parts of these emissions can be assessed. The domestic fraction of fuel used could be assessed using data from other countries with similar circumstances. Information on fuel used for domestic and international transportation can be obtained from international sources (such as the International Energy Agency (IEA)). However, the quality of this information should be assessed before being used.

²² A compilation of the relevant paragraphs from the guidelines under Article 8 on this matter is included as an appendix to this guidance (appendix II).

²³ A compilation of the relevant paragraphs from the guidelines under Article 8 on this matter is included as an appendix to this guidance (appendix II).

²⁴ This option is described in working paper 3(a) (2000), which can be found on the secretariat's web site (<http://unfccc.int/sessions/workshop/000314/>).

2. Methods applicable or not applicable to this subsector

28. In the unlikely event that total CO₂ emission estimates from the sectoral approach are missing, then the reference approach should be used for any adjustment, if possible. Note that the reference approach may not give conservative estimates, as explained in paragraph 34 below. If a country has insufficiently accurate energy data, and the energy data is not available from recognized international sources, no appropriate adjustment method will be suitable.

29. If CO₂ emissions from some subsectors/source categories are missing from the total CO₂ estimates, adjustments can be made by using the options mentioned in table 2, taking into account the need to produce a conservative estimate. For most countries it is normally preferable to use activity data from international statistics and IPCC default emission factor values. It is also possible to apply average parameters derived from a cluster of countries. If other options are not applicable, extrapolation, preferably using drivers, can be used in cases where recent data are missing but for a limited number of years. Although it is possible to use an average Annex I emission rate and a country-specific driver, this is not generally recommended.

30. The fuel totals are generally better known than the fuel consumption in the different sectors. If adjustments are made to individual subsectors, care should be taken that the total CO₂ emissions are in accordance with the total fuel uses if these are known.

31. If CH₄ and N₂O emissions are missing, adjustments can be made by using the options mentioned in table 2, taking into account the need to produce a conservative estimate. If CH₄ and N₂O estimates are missing, and CO₂ emissions are not available at subsector level, it is recommended that the aggregated fuel data be disaggregated into the consuming subsectors and the results used to estimate CH₄ and N₂O emissions using emission factors from a cluster of countries with similar circumstances. If this is not appropriate, the IPCC default emission factors could be used. Extrapolation should be used with care due to possible changes in technologies or performance standards.

32. Activity data on biofuel combustion needed to calculate CH₄ and N₂O emissions may be lacking, or be of questionable quality, in both national and international datasets. It is also generally difficult to define suitable drivers for adjusting such missing emissions. If data are available for at least one year, extrapolation using drivers can be used. If data are not available for any year, data from other countries can be used in cases where national circumstances, including policies, are comparable.

33. If CH₄ and N₂O estimates are missing, and CO₂ emissions are available for each subsector, in addition to the options above it is possible to use an average ratio between CH₄ and CO₂ emissions, as well as an average ratio between N₂O and CO₂ emissions, for all Annex I countries or a cluster of countries.²⁵

3. Conservative approach in the fuel combustion subsector

34. There is a particular challenge in ensuring that adjusted estimates are conservative when using the CO₂ estimates from the reference approach to make adjustments. A conservative approach should be ensured particularly when estimating carbon stored. Uncertainties are usually not available for the reference approach, and it is not feasible to consider ranges in data, since a large number of parameters enter the calculation.

²⁵ This option is described in working paper 3(b) (2000), which can be found on the secretariat's web site (<http://unfccc.int/sessions/workshop/000314/>).

Table 2. Sector-specific adjustment methods applicable to the fuel combustion subsector

Source category: 1.A Fuel combustion (all source categories) — CO ₂ , CH ₄ and N ₂ O	Missing estimate	Not prepared in accordance with the IPCC Guidelines as elaborated by the IPCC good practice guidance			Comments
		Emission factor or other parameter inappropriate/missing	Activity data inappropriate/missing	Method inappropriate	
A. Interpolation of emission estimates or parameters	CO ₂ ^(a) CH ₄ & N ₂ O ^(b)	CO ₂ ^(a) CH ₄ & N ₂ O ^(b)	CO ₂ ^(a) CH ₄ & N ₂ O ^(b)		For inappropriate/missing emission factor, parameter or activity data, this method is applicable only in cases where data are missing and/or when in a particular year of the time series the data are inappropriate. ^(a) Unlikely to be needed for CO ₂ . ^(b) More likely to be needed for CH ₄ and N ₂ O.
B. Extrapolation of emission estimates or parameters	CO ₂ ^(a) CH ₄ & N ₂ O ^(b)	CO ₂ ^(a) CH ₄ & N ₂ O ^(b)	CO ₂ ^(a) CH ₄ & N ₂ O ^(b)		For inappropriate/missing emission factor, parameter or activity data, this method is applicable only in cases where data are missing and/or when in a particular year of the time series the data are inappropriate. ^(a) For CO ₂ , extrapolation can be recommended (e.g. delay in final energy data). Other options are, however, preferable. ^(b) For CH ₄ and N ₂ O, extrapolation can be recommended, but care has to be taken in its application, as technology has to be taken into account.
C. Extrapolation of emissions or parameters using drivers or surrogate data	CO ₂ ^(a) CH ₄ & N ₂ O ^(b)	CO ₂ ^(a) CH ₄ & N ₂ O ^(b)	CO ₂ ^(a) CH ₄ & N ₂ O ^(b)		^(a) For CO ₂ , this method is preferable to A and B. ^(b) Extrapolation can be recommended, but care has to be taken in its application as technology has to be taken into account.
D. Application of data from international databases	CO ₂ CH ₄ & N ₂ O ^(b)	CO ₂ CH ₄ & N ₂ O ^(b)	CO ₂ CH ₄ & N ₂ O ^(b)		<i>This would be part of the tier 1 method.</i> ^(b) For CH ₄ and N ₂ O emission factors, the IGES or any other databases (e.g. IPCC emission factor database) could be used.
E. Application of IPCC default emission factor value	CO ₂ CH ₄ & N ₂ O ^(b)	CO ₂ CH ₄ & N ₂ O ^(b)			<i>Application of IPCC default emission factor values would be part of the tier 1 method.</i> ^(b) For CH ₄ and N ₂ O, special consideration has to be given to ensure that estimates are conservative.
F. Application of an average parameter for a cluster of countries	CO ₂ CH ₄ & N ₂ O ^(b)	CO ₂ CH ₄ & N ₂ O ^(b)			^(b) Preferable to tier 1.
G. Application of IPCC tier 1 methods	CO ₂ CH ₄ & N ₂ O			CO ₂ CH ₄ & N ₂ O	
H. Emission estimation using an average Annex I emission rate and a country-specific driver	CO ₂ CH ₄ & N ₂ O	CH ₄ & N ₂ O	CH ₄ & N ₂ O	CH ₄ & N ₂ O	Not highly recommended.
I. Linkages of emissions between gases or source categories	CH ₄ & N ₂ O	CH ₄ & N ₂ O			Appropriate ratios for CH ₄ and N ₂ O can be established using CO ₂ estimates. The UNFCCC GHG database could be used for this purpose.

Note: This table covers all sub-sources from the fuel combustion sector. Unlike in the sector-specific tables in this guidance, the indication of applicability of the different methods is indicated by gas rather than by source categories.

If better information is not available, it is recommended that an uncertainty of ± 15 per cent be assumed as the basis of a conservative assessment and also the rules outlined in paragraph 20 (adjust the estimate down by 7.5 per cent in base year and up by 7.5 per cent in commitment period if applicable).

35. When CO₂ estimates for fuel combustion based on the sectoral approach are used for adjustments, the use of conservative values must be ensured for emission factors and/or energy data, depending on the basis for the adjustment. When the adjustment involves energy data, the uncertainty, if available, should be used to ensure that the estimate is conservative. If uncertainties in energy data are not available for the Party in question or a Party assessed to have energy statistics of comparable quality, the use of an uncertainty of ± 15 per cent is recommended as a basis for a conservative assessment (together with the rules outlined in paragraph 20). CO₂ emission factors for most fuels have a low uncertainty, but a conservative approach should be ensured for coal, natural gas and other fuels having a spread in carbon content. The use of ranges in carbon content is recommended, based for example on the IPCC Guidelines.

36. For N₂O and CH₄ from fuel combustion, the same considerations for energy data apply as described in paragraph 35. For emission factors it is recommended that a conservative approach be ensured through the use of uncertainties as given in the IPCC good practice guidance, ranges in emission factors given in the IPCC Guidelines or ranges in implied emission factors from a cluster of countries with similar circumstances (together with the rules outlined in paragraph 20). It is particularly important to ensure that adjustments are conservative for emissions of N₂O that can be increasing, for example for road transport.

4. Relevant international sources of activity data and possible drivers

37. For adjustment methods taking activity data into consideration, the following international activity data available from the following sources can be used:

- (a) United Nations Statistics Division
 - (i) Industrial Commodity Statistics Yearbook
 - (ii) Monthly Bulletin of Statistics
- (b) International Energy Agency (IEA)
- (c) European Commission, Directorate General for Energy: Annual Energy Review (covers Annex I and non-Annex I Parties)
- (d) Eurostat (for Europe)
- (e) Food and Agricultural Organization of the United Nations (for biofuels)

38. For extrapolations (method C), drivers as given in table 3 could be used. Drivers at the macroeconomic level are usually better correlated to relatively aggregated emissions than to subsector-specific emissions.²⁶ Expert review teams should first refer to national statistical data for use as a driver. If national data are not available, the international sources listed in table 3 could be used to obtain this information.

²⁶ This option is described in working paper 3(c) (2000), which can be found on the secretariat's web site (<http://unfccc.int/sessions/workshop/000314/>).

Table 3. Drivers for emissions from fuel combustion activities

Source category	Possible drivers	International data sources
1.A.1 Energy industries	Gross domestic product (GDP)	Organisation for Economic Co-operation and Development (OECD), World Bank
1.A.1.a Public electricity and heat production	GDP Public electricity production/output	OECD, World Bank United Nations, IEA, EUROSTAT, UNIPED
1.A.1.b Petroleum refining	Crude oil throughput Other production data (if available) GDP(last resort)	United Nations, IEA, EUROSTAT OECD, World Bank
1.A.2 Manufacturing industries and construction	Production data (iron, steel, etc.) (highly recommended) Production index Value added GDP(last resort)	United Nations, OECD, EUROSTAT, CEMBUREAU (for cement) OECD, World Bank
1.A.3 Transport		
1.A.3.a Civil aviation	Number of landings and take offs Transport performance (passenger km, tonnes km)	ICAO, EUROSTAT
1.A.3.b Road transportation	Transport performance (passenger km, tonnes km, vehicle km) Number of car registrations (last resort)	EUROSTAT
1.A.3.c Railways	Transport performance (passenger km, tonnes km)	EUROSTAT
1.A.3.d Navigation	Transport performance (passenger km, tonnes km)	EUROSTAT
1.A.4 Other sectors		
1.A.4.a Commercial/institutional	Number of m ³ or m ² of buildings [Employees] Degree days	
1.A.4.b Residential – CO ₂	Population Number of households Income (in \$) Consumption (in \$) Degree days	United Nations, OECD, EUROSTAT
1.A.4.b Residential – CH ₄ , N ₂ O	Bio-energy (crop/fuel wood production data)	FAO, (IEA)
1.A.4.c Agriculture/forestry/fisheries	Value added	OECD, World Bank, EUROSTAT

B. Energy: 1.B Fugitive emissions from fuels**1. General characteristics of the subsector**

39. Fugitive emissions from fuels are divided into two main source categories:

(a) Solid fuels - This category is subdivided into fugitive methane emissions from coal mining and handling and that from solid fuel transformation. Fugitive emissions resulting from other solid fuels, such as peat, can be treated using the same adjustment principles as for coal.

(b) Oil and natural gas - This category accounts for all direct GHG emissions, except those from fuel combustion, which may be attributed to oil and gas exploration, production, processing/refining, transmissions or final distribution activities. For reporting purposes, the category is

subdivided into three categories: fugitive emissions from gas systems, fugitive emissions from oil systems, and venting and flaring emissions from oil and gas systems.

2. Methods applicable or not applicable to this subsector

40. If CH₄ emissions from some subsectors/source categories are missing, adjustments can be made by using the options mentioned in table 4 for coal mining and oil and gas systems, taking into account the need to produce a conservative estimate.

41. For coal mining, the preferred option is to use activity data from national or international sources and the IPCC default method and emission factors, taking care to ensure that the estimate is conservative. It is possible to use forward extrapolation for a limited number of years. Backward extrapolation should be used with care due to changes in technology and performance standards. In principle, the use of an average parameter for a cluster of countries is applicable, but this would need to take into account the technology or type of mines. In particular, it is important to distinguish between surface and underground mines. Although this information is not generally published in international sources, it may be obtained (for some countries) through special requests to international statistical organizations (e.g. IEA).

42. For the oil and gas subsector, the methodologies require a large amount of data that are usually unavailable. It is generally difficult to make adjustments at the level of higher tier methods. In general, interpolation and extrapolation are not applicable at a tier 1 level due to changes in technology and performance standards, but could be applied at a disaggregated level. It is recommended that national energy production and refinery statistics are used to interpolate or make moderate extrapolations of emission estimates already available for a given country. However, extrapolation or interpolation between countries is not recommended. If adjustments are to be made for one or more source categories, the preferred option is to use data from national or international sources together with the IPCC default method and emission factors, taking care to ensure that the estimate is conservative.

3. Conservative approach in the fugitive emissions subsector

43. For adjustments in fugitive emissions from energy production, storage and distribution, a conservative approach should be ensured, preferably through the use of uncertainties as given in the IPCC good practice guidance and the rules outlined in paragraph 20. Ranges in default emission factors given in the IPCC Guidelines can also be used, but this is a less preferred option.

4. Relevant international sources of activity data and possible drivers

44. For adjustment methods taking activity data into consideration, the following international activity data on production of fossil fuels, available from the following sources, can be used:

- (a) United Nations Statistics Division:
 - (i) Industrial Commodity Statistics Yearbook
 - (ii) Monthly Bulletin of Statistics
- (b) International Energy Agency
- (c) *Oil and Gas Journal*
- (d) Eurostat (for Europe)

Table 4. Sector-specific adjustment methods applicable to the fugitive fuel emissions sector

Source category: 1.B.1 Solid fuels – CH ₄ 1.B.2 Oil and natural gas – CH ₄	Missing estimate	Not prepared in accordance with the IPCC Guidelines as elaborated by the IPCC good practice guidance			Comments
		Emission factor or other parameter inappropriate/missing	Activity data inappropriate/missing	Method inappropriate	
A. Interpolation of emission estimates or parameters	1.B.1	1.B.1 1.B.2 (a)	1.B.1 1.B.2 (a)		For inappropriate/missing emission factor, parameter or activity data, this method is applicable only in cases where data are missing and/or when in a particular year of the time series the data are inappropriate. (a) In general not applicable at a higher level of aggregation, but could be applied at a disaggregated source category level.
B. Extrapolation of emission estimates or parameters	1.B.1 (a)	1.B.1 (a) 1.B.2 (b)	1.B.1 (a) 1.B.2 (b)		For inappropriate/missing emission factor, parameter or activity data, this method is applicable only in cases where data are missing and/or when in a particular year of the time series the data are inappropriate. (a) Forwards extrapolation acceptable, but care needed for backward extrapolation. (b) In general not applicable at a higher level of aggregation, but could be applied at a disaggregated source category level.
C. Extrapolation of emissions (or parameters for 1.B.1) using drivers or surrogate data	1.B.1 (a)	1.B.1 (a) 1.B.2 (b)	1.B.1 (a) 1.B.2 (b)		(a) In principle applicable, but activity data necessary for identifying which drivers should be available in the first place. (b) In general not applicable at a higher level, but could be applied at a disaggregated level.
D. Application of data from international databases	1.B.1 1.B.2 (b)	1.B.1 1.B.2 (b)	1.B.1 1.B.2 (b)		(b) In general, data for venting and flaring are not of as high quality as those reported to IEA.
E. Application of IPCC default emission factor value	1.B.1 1.B.2	1.B.1 1.B.2			
F. Application of an average parameter for a cluster of countries	1.B.1 (a) 1.B.2 (b)	1.B.2 (b)			(a) In principle applicable, but it would be necessary to take into account the technology or types of mines. Other options are preferable. (b) In principle applicable, for certain clusters of countries with similar circumstances, but technology differences need to be taken into account.
G. Application of IPCC tier 1 methods	1.B.1 1.B.2			1.B.1 1.B.2	
H. Emission estimation using an average Annex I emission rate and a country-specific driver					
I. Linkage of emissions between gases or source categories					

45. There are limited cases where the use of drivers (method C) is possible in this sector. When needed for adjustment purposes, expert review teams should first refer to national statistical data for use as a driver. In some cases, national production data can be considered as a driver. Other appropriate drivers are more difficult to obtain. If national data are not available, this information could be obtained from the international sources listed in table 5.

Table 5. Drivers for fugitive emissions from fuels

Source category	Possible drivers	International data sources
1.B.1 Solid fuels	No drivers (other than production data) are recommended	
1.B.2 Oil and natural gas	Well counts Number of wells drilled Crude oil throughput (for refineries) Facility counts Pipeline breaks and well blow-outs Pipeline lengths Per capita statistics (population, consumption of natural gas)	<i>Oil and Gas Journal</i> , United Nations, OECD, IEA, EUROSTAT

C. 2 Industrial processes

1. General characteristics of the sector

46. GHG emissions are produced from a variety of industrial activities which are not related to energy.²⁷ The main emission sources are industrial production processes which chemically or physically transform materials. During these processes, many different GHGs, including CO₂, CH₄, N₂O, HFCs and PFCs, can be released. Cement production is a notable example of an industrial process that releases a significant amount of CO₂. Different halocarbons (and SF₆) are also consumed or produced in industrial processes or used as alternatives to ozone depleting substances (ODS) in various applications.

2. Methods applicable or not applicable to this sector

47. Tables 6 and 7 below list all methods that could be used to apply adjustments in the industrial processes sector. When applying adjustments in this sector, consideration needs to be given to any information available regarding technology characteristics of the source category (such as the existence of abatement technology).

48. If estimates from any source category are missing, the most appropriate methods for making an adjustment are, in general, either to apply the IPCC tier 1 method or to use data from international databases (which also applies in the case where activity data are found to be inappropriate), since in most cases the reason for a missing estimate would very likely be a lack of data. However, data from international sources may be difficult to obtain, depending on the source category.

49. Alternatively, emission estimates could be extrapolated or interpolated, but preference should be given to extrapolation using drivers or surrogate data (method C), as this approach is likely to reflect actual trends more closely. In selecting appropriate drivers (see table 8 below for possible drivers), preference should be given to energy data provided as part of the submitted inventory, where available. Energy data would be relevant, for example, for cement, iron and steel, and aluminium production. Where appropriate energy data for iron and steel and aluminium production are not available, pig iron production and aluminum production data might be equally suitable drivers.

²⁷ The guidance in this section assumes that the sectoral approach has been applied in the energy sector. The expert review team should also note the possibility of double counting (for instance, the use of lime in iron and steel production).

3. Conservative approach in the industrial processes sector

50. A conservative approach in many industrial processes source categories (such as production of nitric and adipic acid, iron and steel, ammonia, aluminium) can be ensured by choosing a conservative emission factor from a range of possible values. The following should be taken into account in applying a conservative approach to a range of emission factors:

- (a) For nitric acid production: If no information is available to support the choice of the emission factor, a factor based on older production processes should be assumed.
- (b) For adipic acid production: The non-abatement range as given in the IPCC good practice guidance (300 Kg/t +/- 10 per cent) should be used.
- (c) For ammonia production: The ranges as given in the IPCC Guidelines should be used.
- (d) For iron and steel production: The value from the IPCC Guidelines (1.6) for production data should be used and the uncertainty range for emission factors for reducing agents (in the IPCC good practice guidance generally +/- 5 per cent) should be applied; any information on uncertainty of activity data should be considered.
- (e) For PFCs from aluminium production: The range given in the IPCC good practice guidance should be taken and a conservative approach applied; the range is large but still applicable.

51. For HFC, PFC and SF₆ estimates from the consumption of halocarbons and SF₆, conservative estimates can be produced by choosing conservative values from a range of other relevant parameters, such as uncertainty for sales figures (e.g. foam blowing) and other parameters (such as composition of the mix in coolant) as given in the IPCC good practice guidance.

52. For some sources, such as cement production, neither a range of emission factors nor other relevant parameters can be used for applying a conservative approach, as such ranges do not exist. In these cases, the approach described in paragraphs 53 and 54 below could be applied.

53. Uncertainty is an element that can be used consistently in the industrial processes sector to apply a conservative approach. The uncertainty range around a point estimate from uncertainty data available from the following sources can be used to make the adjusted estimates conservative:

- (i) Other Annex I Parties
- (ii) Other Annex I Parties with similar circumstances
- (iii) Statistical analysis of the national trend (variability of the data, regression analysis, etc.), applicable to all cases of interpolation and extrapolation
- (iv) The same country in the previous year

54. For cement and ammonia production, the use of the uncertainty range from the Party's previous years' inventory is the preferred option for making the estimates conservative.

Table 6. Sector-specific adjustment methods applicable to the industrial processes sector – CO₂, CH₄ and N₂O

Source category:	Not prepared in accordance with the IPCC guidelines as elaborated by the IPCC good practice guidance				Comments
	Missing estimate	Emission factor or other parameter inappropriate	Activity data inappropriate/missing	Method inappropriate/missing	
2.A.1 Cement production 2.B.2 Nitric acid production 2.B.3 Adipic acid production 2.B.1 Ammonia production 2.C.1 Iron and steel production	2.A.1 2.B.1 2.B.2 & 2.B.3 2.C.1		2.A.1 2.B.1 2.B.2 & 2.B.3 2.C.1		For inappropriate/missing emission factor, parameter or activity data, this method is applicable only in cases where data are missing and/or when in a particular year of the time series the data are inappropriate.
A. Interpolation of emission estimates or parameters	2.A.1 2.B.1 2.B.2 & 2.B.3 ^(a) 2.C.1		2.A.1 2.B.1 2.B.2 & 2.B.3 2.C.1		For inappropriate/missing emission factor, parameter or activity data, this method is applicable only in cases where data are missing and/or when in a particular year of the time series the data are inappropriate. ^(a) The expert review team should take note of the possible existence of abatement technology and that nitric acid is not an end product (availability of parameters may be limited).
B. Extrapolation of emission estimates or parameters	2.A.1 ^(a) 2.B.1 2.B.2 & 2.B.3 2.C.1		2.A.1 ^(a) 2.B.1 2.B.2 & 2.B.3 2.C.1		^(a) Method C is preferable to A or B as this approach is likely to reflect actual trends more closely.
C. Extrapolation of emissions using drivers or surrogate data	2.A.1 ^(a) 2.B.1 ^(b) 2.B.2 & 2.B.3 ^(c) 2.C.1 ^(d)		2.A.1 ^(a) 2.B.1 2.B.2 & 2.B.3 ^(c) 2.C.1		^(a) It is preferable to use this method (as the reason for no estimate is most likely a lack of data). Production data available from international sources. If data are not up to date then data should be extrapolated on the basis of most recent data. ^(b) It is preferable to use this method. However, production data from international sources may be difficult to obtain (ammonia is not an end product). If data are not up to date then they should be extrapolated from earlier data. ^(c) It is preferable to use this method. However, for nitric acid, production data from international sources may be difficult to obtain (nitric acid is not an end product) and often international statistics may report higher values than national statistics. If data are not up to date then data should be extrapolated on the basis of the most recent data. ^(d) It is preferable to use this method (as the reason for no estimate is most likely a lack of data). Production data are available from international sources. If data are not up to date then they should be extrapolated on the basis of the most recent data.
D. Application of data from international databases					

Table 6. Sector-specific adjustment methods applicable to the industrial processes sector – CO₂, CH₄ and N₂O (continued)

Source category: 2.A.1 Cement production 2.B.2 Nitric acid production 2.B.3 Adipic acid production 2.B.1 Ammonia production 2.C.1 Iron and steel production	Missing estimate	Not prepared in accordance with the IPCC guidelines as elaborated by the IPCC good practice guidance			Comments
		Emission factor or other parameter inappropriate	Activity data inappropriate/missing	Method inappropriate/missing	
E. Application of IPCC default value		2.A.1 ^(a) 2.B.1 2.B.2 & 2.B.3 ^(b) 2.C.1			^(a) Only one choice as there is no range of emission factors. ^(b) There are ranges of emission factors. For nitric acid the range is large. The conservative emission factors could be difficult to identify. The expert review team should consider any technology-related information available in its choice of emission factors. In the absence of information those that would result in more conservative results could be selected.
F. Application of an average parameter for a cluster of countries	2.A.1 2.B.1 2.B.2 & 2.B.3 2.C.1		2.A.1 2.B.1 2.B.2 & 2.B.3 2.C.1		Least preferred option.
G. Application of IPCC tier 1 methods	2.A.1 ^(a) 2.B.1 ^(b) 2.B.2 & 2.B.3 ^(c) 2.C.1 ^(d)		2.A.1 ^(a) 2.B.2 & 2.B.3 2.C.1	2.A.1 2.B.1 2.B.2 & 2.B.3 2.C.1	^(a) It is preferable to use this method (as the reason for no estimate is most likely a lack of data). Production data are available from international sources. If data are not up to date then they should be extrapolated on the basis of the most recent data. ^(b) It is preferable to use this method. However, production data from international sources may be difficult to obtain (ammonia is not an end product). If data are not up to date then they should be extrapolated from earlier data. ^(c) It is preferable to use this method. However, for nitric acid, production data from international sources may be difficult to obtain (nitric acid is not an end product) and often international statistics may report higher values than national statistics. If data are not up to date then they should be extrapolated on the basis of the most recent data. ^(d) It is preferable to use this method (as the reason for no estimate is most likely a lack of data). Production data are available from international sources. If data are not up to date then they should be extrapolated on the basis of the most recent data.
H. Emission estimation using an average Annex I emission rate and a country-specific driver					Not recommendable for 2.A.1.
I. Linkage of emissions between gases or source categories					Not recommendable for 2.A.1.
J. Tier 2				2.A.1 ^(a)	^(a) Time consuming. Could only be used in the case where this source is a key source.

Table 7. Sector-specific adjustment methods applicable to the industrial processes sector – HFCs, PFCs and SF₆

Source category: 2.C.3 Aluminium production – PFCs	Missing estimate	Not prepared in accordance with the IPCC guidelines as elaborated by the IPCC good practice guidance			Comments
		Emission factor or other parameter inappropriate	Activity data inappropriate/missing	Method inappropriate/missing	
2.F Consumption of halocarbons and SF ₆ (ODS substitutes) – HFCs, PFCs, SF ₆					
A. Interpolation of emission estimates or parameters	2.C.3 2.F ^(a)		2.C.3 2.F ^(a)		For inappropriate/missing emission factor, parameter or activity data, this method is applicable only in cases where data are missing and/or when in a particular year of the time series the data are inappropriate. ^(a) This approach can be used for 2.F, if possible; however, data might not be available for any year.
B. Extrapolation of emission estimates or parameters	2.C.3 2.F ^(a)		2.C.3 2.F ^(a)		For inappropriate/missing emission factor, parameter or activity data, this method is applicable only in cases where data are missing and/or when in a particular year of the time series the data are inappropriate. ^(a) This approach can be used for 2.F, if possible; however, data might not be available for any year.
C. Extrapolation of emissions using drivers or surrogate data	2.C.3 ^(a) 2.F		2.C.3 2.F		^(a) The expert review team should take note of the possible existence of different technologies. (This method should be given priority before using A or B.)
D. Application of data from international databases	2.C.3 ^(a)		2.C.3 ^(a)		^(a) It is preferable to use this method. Production data available from international sources. If data are not up to date then they should be extrapolated on the basis of the most recent data.
E. Application of IPCC default value		2.C.3 ^(a) 2.F ^(b)			^(a) Range of emission factors. The expert review team should consider any technology-related information available in its choice of emission factors. In the absence of information, it could select those that would result in more conservative results. ^(b) If Party used tier 2 and inappropriate emission factor then default emission factor should be used. The expert review team should check for deviation from good practice guidance to judge appropriateness of emission factors.
F. Application of an average parameter for a cluster of countries	2.C.3 ^(a) 2.F ^(b)		2.C.3 2.F		^(a) Less applicable. ^(b) i. relationship with CFCs (phase out - introduction of halocarbons) in other countries.
G. Application of IPCC tier 1 methods	2.C.3 ^(a)		2.C.3	2.C.3 2.F ^(b)	ii. The expert review team could use an HFC-mixed average of other countries. ^(a) It is preferable to use this method. Production data available from international sources. If data are not up to date then they should be extrapolated on the basis of the most recent data. There is a range of emission factors; the expert review team should consider any technology-related information available in its choice of emission factors. In the absence of information, it could select those that would result in more conservative results. ^(b) Tier 1a (easier than 1b, but 1b is likely to be more conservative).
H. Emission estimation using an average Annex I emission rate and a country-specific driver	2.F		2.F	2.F	
I. Linkage of emissions between gases or source categories	2.C.3 ^(a)				^(a) Linkage between CF ₄ and C ₂ F ₆ .
J. Tier 2				2.F ^(a)	For PFCs from aluminium production (2.C.3) this method is not recommended. Tier 2 requires plant-specific data; these are likely to be not available or their compilation is likely to be time consuming. ^(a) It is only recommended if this source is a key source.

4. Relevant international sources of activity data and possible drivers

55. For adjustment methods taking activity data into consideration, the following international sources can be used: United Nations Industrial Commodity Statistics, International Iron and Steel Institute and the United States Geological Survey.

56. For methods of extrapolation of emissions or parameters based on the use of drivers or surrogate data (method C), as appropriate, drivers as given in table 8 below could be used.

Table 8. Drivers for emissions from the industrial processes sector

Source category	Possible drivers	International data sources
2.A.1 Cement production	Industrial GDP Total GDP Population Sectoral energy use	United Nations United Nations United Nations National (from the energy sector of the inventory)
2.B.2 Nitric acid production	Fertilizer production	
2.B.3 Adipic acid production	Synthetic fibre production	
2.C.1 Iron and steel production	Pig iron production	United Nations, International Iron and Steel Institute
	Sectoral energy use	National (from the energy sector of the inventory)
	Metal production GDP	International Iron and Steel Institute
	Industrial GDP	United Nations
2.C.3 Aluminium production	Aluminium production	United Nations, United States Geological Survey
	Sectoral energy use	National (from the energy sector of the inventory)
	Metal production GDP	International Iron and Steel Institute
	Industrial GDP	United Nations
2.F Consumption of halocarbons and SF ₆	CFCs	
	GDP	United Nations
	Population	United Nations
	Energy intensity	United Nations, IEA
2.B.1 Ammonia production	Fertilizer production	

D. 3 Solvents and other product use

(No specific guidance on this sector will be necessary because GHG emissions are relatively small.)

E. 4 Agriculture

1. General characteristics of the sector

57. Emissions from agriculture encompass all GHG emissions from the agricultural sector;²⁸ main sources include CH₄ emissions from enteric fermentation, CH₄ emissions from manure management, CH₄ emissions from rice production, N₂O emissions from agricultural soils, N₂O emissions from manure management systems, CH₄ and N₂O emissions from savanna burning, and CH₄ and N₂O emissions from agricultural residues burning.

²⁸ Except fuel combustion (reported under energy), sewage emissions (reported under waste) and CO₂ emissions from soils (reported under land-use change and forestry).

2. Methods applicable or not applicable to this sector

58. Where an adjustment of an agricultural estimate has to be made, the IPCC tier 1 method, together with IPCC default emission factors, if needed, can be applied for all source categories, provided that activity data as input are available. International data sources (FAO and others, see table 9), are an important source for obtaining missing activity data; however, data on burning are scarce.

59. Alternatively, interpolation/extrapolation could be used in all cases, including interpolation/extrapolation of emission estimates, activity data, emission factors or any other relevant parameters, depending on the circumstances. These should always be based on trend analysis, and, when applying extrapolation, year-to-year fluctuations need to be considered. Interpolation/extrapolation methods based on drivers or surrogated data are not an option for making adjustments in the agriculture sector.

60. Other alternatives for preparing an adjusted estimate are listed in table 9 below.

3. Conservative approach in the agriculture sector

61. Conservative estimates in the agriculture sector can be produced for many source categories by choosing a value from a range of emission factors. The source categories for which this is applicable are:

(a) CH₄ from enteric fermentation (for emission factor ranges see page 4.27 of the IPCC good practice guidance);

(b) N₂O from manure management, where the emission factor EF3 is likely to dominate the uncertainty of the estimates (for ranges of EF3 see table 4.12 of the IPCC good practice guidance);

(c) CH₄ from rice cultivation (for emission factor ranges see page 4.82 of the IPCC good practice guidance);

(d) Indirect N₂O emissions from agricultural soils (for emission factor ranges see page 4.75 of the IPCC good practice guidance).

62. For direct N₂O emissions from agricultural soils, conservative estimates could be obtained using ranges for relevant parameters relating to crop residues, as given in the IPCC good practice guidance (see table 4.16).

63. Uncertainty ranges around point estimates could always be applied for obtaining conservative estimates within the agriculture source categories, provided the uncertainty data are from countries with similar national circumstances. In addition, uncertainty data from other Annex I Parties could be used in the case of prescribed burning of savannas and field burning of agricultural residues.²⁹

²⁹ Further work is needed in assessing analysis undertaken by Annex I Parties in this field.

Table 9. Sector-specific adjustment methods applicable to the agriculture sector

Source category: 4.A Enteric fermentation - CH ₄ 4.B Manure management - CH ₄ and N ₂ O 4.C Rice cultivation - CH ₄ 4.D Agricultural soils - N ₂ O 4.E Prescribed burning of savannas - CH ₄ and N ₂ O 4.F Field burning of agricultural residues - CH ₄ and N ₂ O	Missing estimate	Not prepared in accordance with the IPCC guidelines as elaborated by the IPCC good practice guidance			Comments
		Emission factor or other parameter inappropriate	Activity data inappropriate/missing	Method inappropriate/missing	
A. Interpolation of emission estimates or parameters	4.A	4.A	4.A	4.A	For inappropriate/missing emission factor, parameter or activity data, this method is applicable only in cases where data are missing and/or when in a particular year of the time series the data are inappropriate. It may be necessary to use interpolation at the level of emission estimates, emission factors or other parameters, depending on the circumstances; it should be based on trend analysis.
	4.B	4.B	4.B	4.B	
	4.C	4.C	4.C	4.C	
	4.D	4.D	4.D	4.D	
	4.E	4.E	4.E	4.E	
B. Extrapolation of emission estimates or parameters	4.F	4.F	4.F	4.F	For inappropriate/missing emission factor, parameter or activity data, this method is applicable only in cases where data are missing and/or when in a particular year of the time series the data are inappropriate. It may be necessary to use extrapolation at the level of emission estimates, emission factors or other parameters, depending on the circumstances; it should be based on trend analysis, taking into account year-to-year fluctuations.
	4.A	4.A	4.A	4.A	
	4.B	4.B	4.B	4.B	
	4.C	4.C	4.C	4.C	
	4.D	4.D	4.D	4.D	
C. Extrapolation of emissions using drivers or surrogate data	4.E	4.E	4.E	4.E	Not relevant.
	4.F	4.F	4.F	4.F	
	4.A	4.A	4.A	4.A	
	4.B	4.B	4.B	4.B	
	4.C	4.C	4.C	4.C	
D. Application of data from international databases	4.D	4.D	4.D	4.D	(a) Source: FAO for livestock population. (b) International data are available for livestock numbers (FAO), but not for manure management systems. (c) Sources: FAO, International Rice Research Institute (IRRI). (d) For direct N₂O emissions: FAO (fertilizers), International Industry Fertilizer Association (IFA); for indirect emissions: international data are partially available (for N-deposition) from the European Monitoring and Evaluation Programme (EMEP). (e) Data on areas of savanna burned are at present not published annually but information ought to be available in the literature (and from satellite images). (f) Annual crop production data are the basis for activity data. Source: FAO.
	4.E	4.E	4.E	4.E	
	4.A	4.A	4.A	4.A	
	4.B	4.B	4.B	4.B	
	4.C	4.C	4.C	4.C	

Table 9. Sector-specific adjustment methods applicable to the agriculture sector (continued)

Source category: 4.A Enteric fermentation - CH ₄ 4.B Manure management - CH ₄ and N ₂ O 4.C Rice cultivation - CH ₄ 4.D Agricultural soils - N ₂ O 4.E Prescribed burning of savannas - CH ₄ and N ₂ O 4.F Field burning of agricultural residues - CH ₄ and N ₂ O	Missing estimate	Not prepared in accordance with the IPCC guidelines as elaborated by the IPCC good practice guidance			Comments
		Emission factor or other parameter inappropriate	Activity data inappropriate/missing	Method inappropriate/missing	
E. Application of IPCC default value		4.A 4.B 4.C 4.D ^(b) 4.E 4.F	4.A ^(a) 4.B ^(a) 4.C ^(b) 4.D ^(b)		^(a) The 1996 IPCC Guidelines provide data on how to partition the activity data between management systems. ^(b) Adjustments to be based on IPCC tier 1 methods.
		4.A ^(a) 4.B 4.C			
F. Application of an average parameter for a cluster of countries					^(a) For countries with similar conditions.
G. Application of IPCC tier 1 methods	4.A ^(a) 4.B ^(a) 4.C ^(a) 4.D ^(a,b) 4.E ^(a) 4.F ^(a)	4.A 4.B 4.C 4.D 4.E 4.F		4.A 4.B 4.C 4.D 4.E 4.F	^(a) Requires activity data as input. ^(b) Application of IPCC tier 1 to supply missing estimate.
H. Emission estimation using an average Annex I emission rate and a country-specific driver					CH ₄ and N ₂ O from manure management use the same activity data.
I. Linkage of emissions between gases or source categories			4.D ^(a) 4.E ^(b) 4.F ^(b)		^(a) N ₂ O from pasture, range and paddock manure is to be estimated as other manure management systems. ^(b) The same activity data are used for CH ₄ and N ₂ O.
			4.A 4.B 4.C 4.D 4.E ^(a) 4.F		Interpolation of activity data should be based on trend analysis, taking into account year-to-year fluctuations. ^(a) The same activity data are used for CH ₄ and N ₂ O.
J. Interpolation of missing activity data					

4. Relevant international sources of activity data and possible drivers

64. For adjustment methods taking activity data into consideration, the following international data sources can be used to obtain data on agriculture (see also table 9):

- (a) United Nations: FAO (e.g. for livestock population, rice and crop production, fertilizer use)
- (b) International Rice Research Institute (IRRI)
- (c) International Industry Fertilizer Association (IFA)
- (d) European Monitoring and Evaluation Programme (EMEP)

65. The use of drivers is not relevant in any calculation of adjustments in the agriculture sector.

F. 5 Land-use change and forestry

(To be elaborated after the completion of the IPCC good practice guidance on land-use change and forestry.)

G. 6 Waste

1. General characteristics of the sector

66. The waste sector includes all GHG emissions from solid waste disposal on land, waste-water handling and waste incineration. Solid waste generation, composition and disposal/treatment practices and water disposal/treatment are economically, culturally and politically driven and can vary widely from one country to another, and also with time.

67. Methane emissions from solid waste disposal on land is the most important source in the waste sector. The availability of activity data and parameters used in the calculation influences the choice of method and the estimated emissions.

68. GHG emissions from waste-water treatment vary a great deal from country to country depending on waste-water treatment systems and climate. Emissions from industrial waste-water treatment also depend very much on the type of industry. The IPCC Guidelines do not provide methods for estimating N₂O emissions from industrial waste water, and methods for estimating N₂O emissions from domestic waste water are relatively simple. Some countries apply more sophisticated methods for estimating these emissions.

69. Waste incineration is a minor source of GHG emissions in most countries. Some countries report these emissions in the energy sector.

2. Methods applicable or not applicable to this sector

70. For all source categories in the waste sector, there is the possibility of supplying a missing estimate by applying IPCC default methods. This should, however, not be used if activity data are declining. Also, the activity data need to be adjusted accordingly before using this method. For inappropriate emission factors, IPCC default values or values from international databases could be used in all cases.

71. When using interpolation/extrapolation of emission estimates or other parameters, care has to be taken with declining trends; this is also generally applicable to all source categories.

Table 10. Sector-specific adjustment methods applicable to the waste sector

Source category: 6.A Solid waste disposal sites - CH ₄ 6.B Domestic and industrial waste-water handling 6.C Waste incineration	Missing estimate	Not prepared in accordance with the IPCC guidelines as elaborated by the IPCC good practice guidance			Comments
		Emission factor or other parameter inappropriate/missing	Activity data inappropriate/missing	Method inappropriate	
A. Interpolation of emission estimates or parameters	6.A	6.A ^(a)	6.A ^(a)		For declining trends extrapolation/interpolation should be done carefully (see the IPCC good practice guidance). ^(a) Applicable only in cases where data are missing and/or when in a particular year of the time series the data are inappropriate.
	6.B	6.B ^(a)	6.B ^(a)		
	6.C	6.C ^(a)	6.C ^(a)		
B. Extrapolation of emission estimates or parameters	6.A	6.A ^(a)	6.A ^(a)		For relevant drivers for source categories 6.A and 6.B, see table on drivers (table 11). For 6.C Waste incineration, no generally applicable drivers were identified. ^(a) Applicable only in cases where data are missing and/or when in a particular year of the time series the data are inappropriate.
	6.B	6.B ^(a)	6.B ^(a)		
	6.C	6.C ^(a)	6.C ^(a)		
C. Extrapolation of emission estimates or parameters using drivers or surrogate data	6.A	6.A ^(a)	6.A ^(a)		^(a) Population, urban population or GDP per capita and waste generation rates could be used to estimate the volume of solid waste.
	6.B	6.B ^(a)	6.B ^(a)		
	6.C	6.C ^(a)	6.C ^(a)		
D. Application of data from international databases		6.A	6.A ^(a)		If estimates are provided for some years and data are available, method F should not be applied. Limitation: The cluster of countries should be carefully selected, based mainly on waste management practices (see the IPCC good practice guidance). ^(a) Population, urban population or GDP per capita and waste generation rates could be used to estimate the volume of solid waste.
		6.B	6.B		
		6.C	6.C		
E. Application of IPCC default value		6.A	6.A ^(a)		In accordance with the IPCC good practice guidance, the IPCC default method should not be used for declining trends in activity data. Adjustments could be calculated using this method if the activity data are adjusted accordingly.
		6.B	6.B ^(a)		
		6.C	6.C		
F. Application of an average parameter for a cluster of countries	6.A	6.A	6.A ^(a)		For 6.C Waste incineration, no generally applicable drivers were identified.
	6.B	6.B ^(b)	6.B ^(b)		
	6.C	6.C	6.C		
G. Application of IPCC default method	6.A			6.A	
	6.B			6.B	
	6.C			6.C	
H. Emission estimation using an average Annex I emission rate and a country-specific driver		6.A			
I. Linkage of emissions between gases or source categories					

3. Conservative approach in the waste sector

72. For all source categories of the waste sector (CH₄ from solid waste disposal sites, domestic and industrial waste-water handling and waste incineration) conservative point estimates, in line with the criteria for a conservative approach outlined in paragraph 20 above, can generally be obtained based on:

(a) Conservative parameters or, in the case of waste incineration, emission factors selected from a range of possible values;

(b) Uncertainty ranges around a point estimated from uncertainty data available from other Parties with similar circumstances (however, in the case of waste-water handling this possibility is applicable only to domestic waste water).

73. For CH₄ from solid waste disposal on land, it is also possible to make conservative estimates by choosing conservative values from a range of possible activity data.

74. In all cases the selection of conservative parameters, emission factors or activity data, as appropriate, should aim to produce final adjusted estimates for the base year and years of the commitment period consistent with the principles and percentiles set out in paragraph 20 above.

4. Relevant international sources of activity data and possible drivers

75. For methods of extrapolation of emissions or parameters based on the use of drivers or surrogate data (method C), as appropriate, drivers as given in table 11 below could be used.

Table 11. Possible drivers for emissions from the waste sector

Source category	Possible drivers	International data sources
6.A CH ₄ emissions from solid waste disposal sites	Population/urban population GDP per capita	National statistics United Nations statistics/OECD/ Eurostat (for Europe)
6.B.2 Domestic waste-water handling	Urban population	National statistics United Nations statistics/OECD/ Eurostat (for Europe)
6.B.1 Industrial waste-water handling	Production data associated with the main industries in a specific country as described in table 5.4 of the IPCC good practice guidance.	National statistics United Nations statistics/OECD/ Eurostat (for Europe)

Appendix I

Explanations to assist in the preparation of conservative adjustments

1. Some methods per se produce estimates that tend to be higher than those obtained by other methods. This is the case, for example, when the method takes into account the delay between an activity and the emission. For example, potential emissions of fluorinated gases (production plus imports minus destruction minus exports) are usually higher than actual emissions (that proportion which is released into the atmosphere). In the waste sector, emissions from landfills can be related to the amount of waste deposited in that year or to the amount of waste that has been deposited in the landfill over a number of years.
2. Hence, it is not necessary that estimates for all estimation methodologies be calculated before the appropriate most conservative method is chosen. It means, rather, that such an inherently conservative method be chosen, where possible.
3. The examples below outline how the percentiles established in paragraph 20 would apply for the possible approaches indicated in paragraphs 20 (a)-(c) and 21 (see section III of the guidance).³⁰
4. Example of paragraph 20 (a): The estimate for CH₄ emissions from enteric fermentation for cattle is not provided. Application of the tier 1 method using FAO statistics (e.g. 1,000,000 head) and, in the absence of other information, the range of relevant emission factors for dairy and non-dairy cattle (48-118 kg/head/yr) given in the IPCC Guidelines results in a range of emissions of 48 to 118 Gg CH₄. The possible range of estimates is thus 48-118 Gg CH₄. The 75th percentile³¹ of this range would be: 48 Gg + [(118 Gg - 48 Gg) / 4x3] = 101 Gg. Thus the adjusted value to be used for a year of the commitment period would be 101 Gg.
5. Example of paragraph 20 (b): The estimate for CH₄ emissions from enteric fermentation for cattle is not provided. Application of two or more methods results in a range of possible emissions. In addition to the method above, interpolation of emissions could be used to obtain a value. If the value for year four of a five-year period is missing, and the values for years one to three and five were as follows: 64.6 Gg, 66.5 Gg, 65.3 Gg and 67.8 Gg, respectively, the linearly interpolated value for year four would be 66.9 Gg. In this case the 75th percentile of the range of estimates (48 Gg, 66.9 Gg, 118 Gg) would also be 101 Gg as in example for paragraph 20 (a).
6. Example of paragraph 20 (c): The estimate for N₂O emissions from adipic acid production is not provided. One means of adjustment would be to apply the default by multiplying the activity data (e.g. 1000 kg) by the default emission factor. If there is only one emission factor (e.g. 300 g N₂O/kg adipic acid), the uncertainty information given in the guidelines would be used to make the estimate conservative. In this case the IPCC good practice guidance states that the emission factor's uncertainty is +/- 10 per cent. Applying the uncertainty to the estimate provides a range from 270 kg to 330 kg for the possible emission estimates. Using the 75 percentile rule would result in 315 kg (300 + (30/2) = 315) as the final adjusted estimate.
7. Example of paragraph 21: The estimate for CH₄ emissions from manure management for swine is not provided. It is possible to select conservative parameters to obtain a conservative point estimate of emissions. The activity data used could be taken from the FAO (e.g. 36,572,000 head) and from extrapolation of activity data from previous years (e.g. 36,959,000 head), and the range of emission

³⁰ Once an assessment of the methods detailed in this guidance has been completed (see paragraphs 14 and 15 of section III Conclusions), the examples given in this annex may be revised, as appropriate.

³¹ The 75th percentile is the point at which 75 per cent of the possible estimates are below and 25 per cent of the possible estimates are above.

factors for Annex I could be taken from the IPCC Guidelines: 3 to 19 kg/head/yr. Using the 75th percentile for the range of activity data and the range of emission factors would provide conservative parameters of 36,862,000 head ($36,572,000 + [(36,959,000 - 36,572,000) / 4 \times 3] = 36,862,000$) and 15 kg/head/yr ($3 + [(19 - 3) / 4 \times 3] = 15$). These parameters would result in an emission estimate of 552.9 Gg CH₄.

Appendix II

1. The following paragraphs summarize the provisions that are relevant to adjustments as included in the guidelines for review under Article 8 of the Kyoto Protocol.

Procedures

2. Within the review of the inventory, the expert review team shall list all the problems identified, indicating which would need an adjustment, and send this list to the Annex I Party no later than twenty-five weeks from the submission due date of the annual inventory. This list is prepared under the collective responsibility of the expert review team.

3. The Annex I Party shall comment on these questions within six weeks and, where requested by the review team, may provide revised estimates.

4. If still needed, the expert review team shall calculate adjustments in accordance with this guidance, in consultation with the Party concerned and shall prepare a draft individual inventory review report, which includes, where appropriate, adjusted estimates and related information, within eight weeks of the receipt of the comments on the questions posed, and shall send the draft report to the Party concerned.

5. The Annex I Party shall be provided with four weeks to comment on the draft individual inventory review report and, where appropriate, on whether it accepts or rejects the adjustment, including its rationale. If the Party concerned disagrees with the proposed adjustment(s) the expert review team should send the notification from the Party, along with the recommendation of the expert review team in its final report to the COP/MOP and the Compliance Committee, which will resolve the disagreement in accordance with the procedures and mechanisms on compliance.

Reporting

6. The following information on adjustments shall be reported by the expert review teams in the review reports:

- (a) The original estimate, if applicable;
- (b) The underlying problem;
- (c) The adjusted estimate;
- (d) The rationale for the adjustment;³²
- (e) The assumptions, data and methodology used to calculate the adjustment;
- (f) A description of how the adjustment is conservative;

(g) The expert review team's identification of possible ways for the Annex I Party to address the underlying problem;

³² This includes procedures for selection of the calculation methods used for the adjustments.

- (h) The magnitude of the numerical values related to an adjusted problem as:
- (i) The percentage by which the aggregate adjusted GHG emissions for an Annex I Party exceed the aggregate submitted emissions, defined as aggregate submitted emissions of the gases and taken from the sources listed in Annex A to the Kyoto Protocol, for any single year;³³
 - (ii) The sum of the numerical values of the percentages calculated in subparagraph (i) above for all years of the commitment period for which the review has been conducted;
- (i) The number of reviews that identified and adjusted the problem previously, and the percentage that the key source category contributed to the aggregate submitted emissions, defined as aggregate submitted emissions of the gases and taken from the sources listed in Annex A to the Kyoto Protocol;
- (j) An indication whether the adjustment was agreed upon by the Annex I Party and the expert review team.
-

³³ "Any single year" refers to the years of the commitment period.



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DEVELOPMENT AND TRANSFER OF TECHNOLOGIES

Report of the technology information expert workshop Beijing, China, 18–19 April 2002

Note by the secretariat

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I. INTRODUCTION

A. Mandate

1. By its decision 4/CP.7, the Conference of the Parties requested the secretariat to organize an expert workshop on technology information, including options for the establishment of an information clearing house and enhancement of information centres and networks, and to further define the user needs, criteria for quality control, technical specifications and the role and contribution of the Parties, and to report on options and recommendations to the SBSTA at its sixteenth session (FCCC/CP/2001/13/Add.1, annex, para. 10 (c)-(d)).
2. At its fifteenth session, the SBSTA invited the Parties and relevant international organizations to register and test the prototype technology information system and to submit their views to the secretariat by 15 February 2002 on: technical paper FCCC/TP/2001/2¹; the issues identified in the annex to document FCCC/SBSTA/2001/4²; the roles of Parties in supporting the technology information system; and any feedback on testing the system. It further requested the secretariat to continue its work on the technology information system, drawing on links between its work and the work of existing institutions and networks, in particular, information relating to adaptation technologies; and to explore the feasibility of including information on private and publicly-owned technologies, joint research and development programmes, examples of success stories and case studies on technology transfer (FCCC/SBSTA/2001/8, para. 33 (b)-(d)).

B. Scope of the note

3. The technology information expert workshop was organized by the secretariat with the kind assistance of the Government of China. The workshop was held in Beijing from 18 to 19 April 2002, and was hosted by Tsinghua University.
4. This note presents the report of the workshop. The report takes into account information and ideas presented in workshop presentations, and in panel and general discussions as well as in submissions from Parties (FCCC/SBSTA/2002/MISC.12) and users' feedback provided to the secretariat through direct discussions, e-mails and the TT:CLEAR³ web board.
5. The note should be read in conjunction with the report of the expert meeting on methodologies for technology needs assessments, held in Seoul, Republic of Korea, from 23 to 25 April 2002 (FCCC/SBSTA/2002/INF.7). Additional information relevant to the issues discussed in this note can be found in technical paper FCCC/TP/2001/2, prepared by the secretariat, and the progress report FCCC/SBSTA/2001/4.

C. Possible action by the SBSTA

6. The SBSTA may wish to take note of the information contained in this document, and where necessary:
 - (a) Provide further guidance to the secretariat with regard to its work on the technology information system and web page, including its role in the development of the technology information clearing house;

¹ "Technology transfer clearing house and international information network: proposal for activities".

² "Progress report on the development of a technology information system".

³ <http://ttclear.unfccc.int/ttclear/Jsp>

- (b) Seek technical advice from the Expert Group on Technology Transfer on ways and means to develop the information clearing house and to enhance the technology information centres and networks;
- (c) Invite Parties and relevant international organizations to provide support for the development of the technology information clearing house, including technology information centres and networks

II. REPORT ON THE WORKSHOP

A. Introduction

7. The agenda for the workshop included nine sessions covering issues such as needs and uses of technology information in supporting technology needs assessments, current multilateral technology information activities, role of technology information in donor programmes, feedback to UNFCCC technology information system, options for establishment of an information clearing house and technology transfer networks and matchmaking systems, and the role and contributions of Parties in establishing and maintaining the system. Each session, with the exception of the first one, included presentations followed by group discussions. The agenda was developed, in consultation with Mr. Kok Kee Chow, who was requested by the Chairman of the SBSTA, Mr. Halldor Thorgeirsson, to chair the workshop on his behalf.
8. The workshop was attended by 48 participants, including 18 from non-Annex I Parties, representing Asia and the Pacific (9), Africa (6), and Latin America and the Caribbean (3). Thirteen representatives from Annex I Parties also participated in the workshop, including one representative from countries with economies in transition. Sixteen participants represented seven intergovernmental organizations and one non-governmental organization. One participant from the private sector also attended.
9. The objectives of the expert workshop were to identify and define possible options for establishment of a technology information clearing house and enhancement of technology information networks. In addition, the workshop also reviewed the feedback from Parties on testing TT:CLEAR, and further defined user needs for information, criteria for information quality control, technical specifications of the clearing house and roles and contributions of Parties.
10. The expert workshop generated a total of 29 technical presentations, 3 background papers and a productive discussion at plenary sessions. The agenda, the list of participants and the presentations were made available for reference in hard copies and were posted on TT:CLEAR and on the secretariat's web site⁴.

B. Executive summary

11. A key message is that considerable institutional capacity to provide information relating to the transfer of environmentally sound technologies and know-how already exists. Much of this capacity is distributed among relevant United Nations organizations and specialized agencies, and the national and regional networks which they serve. Therefore one main challenge is to promote effective international coordination on sharing technology transfer information by creating a virtual technology information clearing house, which would include relevant technology information systems, other clearing houses, web sites and networks. Furthermore, significant information on environmentally sound technologies, including on indigenous technologies, exists in many developing countries. Therefore, this cooperation should be promoted also at national level.

⁴ <http://unfccc.int/sessions/workshops.html>

12. A number of participants expressed their belief that the technology transfer clearing house should be more than a web site. In their opinion, the clearing house should:
- (a) Include a network of experts to provide "face to face" assistance and of intermediaries to facilitate contact between the providers and recipients of technologies;
 - (b) Have a strong matchmaking component to help match proposed country actions with donor programmes;
 - (c) Provide information regarding opportunities to participate in workshops and training courses at regional and national level.
13. During the workshop the participants stressed that the provision of information through the clearing house should be demand driven. The system should provide information for all type of users, including practitioners and technical experts directly involved in technology transfer activities.
14. The UNFCCC technology information clearing house could provide fast access to up-to-date information on the latest technology transfer projects, environmentally sound technologies and know-how rather than acting as a super site centralizing information. It should complement and work with existing clearing houses and web sites of other relevant international organizations and national and regional technology information centres and should connect to existing governmental, business and donor networks. Some of these clearing houses and web sites provide useful information which is not necessarily dedicated to the technology transfer process under the UNFCCC. Therefore, it will be useful if a dedicated clearing house like TT:CLEAR will be able to network these nodes, using the Internet, and eliminate the need for a super site.
15. Some of the lessons learned from international organizations which have established and are operating successfully similar clearing houses are:
- (a) The design of the clearing house should be demand driven, customized for well identified needs partners and based on a strategic approach describing how it will fill the specific niche;
 - (b) The overall management should be entrusted to an informal group of experts, including clients of the system. Assessments should be made using benchmarks and performance indicators and, if possible, by external reviews;
 - (c) There would be an advantage in establishing an efficient network of national focal points and encouraging national clearing houses to promote and outreach the service and to make it known;
 - (d) The resource implications can be significant, even for a clearing house with a relative limited scope. There is a need to establish priorities for the clearing house and to maintain a core set of information and rely extensively on links to existing sources of information.
16. It was noted that there is a lack of available information on publicly owned technologies, adaptation technologies and joint research and development programmes. Additional information related to environmental standards and regulations and technologies in agriculture, forestry and waste sectors should be made available through a relevant clearing house. Therefore, one main challenge remains to identify information gaps together with the organizations and mechanisms to fill them.
17. A key element for successful provision of information in support of development and transfer of climate change friendly technologies is to tap into existing governmental, donor and expert networks and mobilize the private sector and other intermediaries to contribute their knowledge and skills.

18. The testing of TT:CLEAR, initiated at the fifteenth session of the SBSTA, generated good feedback and recommendations for improvement of the system. However, the number of registered users was considered insufficient to draw conclusions with regard to the usefulness of the system. Therefore, many participants suggested extending the testing period and initiating an outreach programme to make TT:CLEAR known to a broader audience, including practitioners.

19. The workshop provided a framework for effective exchange of views between Parties on issues related to technology information. While encouraging the secretariat to continue its current effort on the technology information system, the participants were of the view that the system should be promoted and be open to the public. An assessment of its usefulness should then be carried out after a period of one year.

20. Some participants felt that the recently established Expert Group on Technology Transfer could consider the issues related to the design, establishment, peer review and evaluation of the effectiveness of clearing houses.

C. Needs for and uses of technology information in supporting technology needs assessments and implementation of technology transfer activities

21. The technology information component of the framework for meaningful and effective actions to enhance the implementation of Article 4.5 of the Convention (decision 4/CP.7) defines the means, including hardware, software and networking, to facilitate the flow of information between the different stakeholders to enhance the development and transfer of environmentally sound technologies. Technology information is of vital importance for effective implementation of the full range of technology transfer activities under the UNFCCC, including technology needs assessments and implementation of technology transfer activities.

22. Participants suggested that conducting technology needs assessments is a first step towards identifying technologies for which replication, adaptation and dissemination is possible, and towards understanding the barriers which may prevent the transfer of technology and taking action to remove them. In this context, the participants reaffirmed the essential role of ensuring access to up-to-date information on environmentally sound technologies for conducting technology needs assessments. Technology information is needed for preparation of the scoping document, technology selection and ranking, forming partnerships and compilation of information on different donor programmes, analysis of barriers and evaluation of ways to overcome them, and action design.

23. Compilation of technology information for conducting technology needs assessments may include:

- (a) Identification of technological options for each subsector (international and national sources) and analysis of their technical, economic and environmental benefits and limitations as to their implementation potential;
- (b) Identification of key national organizations and stakeholders;
- (c) Information from the donor community on business contacts, relevant donor activities, and market information;
- (d) Information from national stakeholders on priorities, sectoral plans related to technology transfer, previous activities, barriers to technology transfer and private perspective;
- (e) Information from the private sector on technical, economic and environmental data on different technological options, methodologies to assess technologies, and business contacts.

24. In general, the technology is selected on a variety of criteria including development benefits (e.g., job and wealth creation, capacity-building, social acceptance of the technology), market potential and sustainability (availability of finance, investment sustainability, maintenance costs, commercial availability, replication potential). One challenge is how to balance these criteria (country driven). In this context, the inventory of methods, models and tools should contain also tools to support decision analysis.

25. The perspective of some participants with experience in providing support and building capacity for undertaking technology needs assessments was also presented at the workshop. According to them:

(a) One key element for accessing reliable technology information is to tap into technical, business and governmental networks;

(b) The intermediaries have a significant "middleman" role in relaying the appropriate information to the business sector;

(c) Information was sometimes missing on local technologies, market potential of technologies, technical experts that may provide support, and methods, models and tools which may be used to conduct technology needs assessments.

26. Participants noted that a considerable amount of information comes from national sources such as national communications, national development plans, national mitigation analyses, and stakeholders. Therefore, it was suggested that the establishment of national clearing houses on technology transfer may prove useful for strengthening the access to appropriate local information.

27. During its presentation, the UNFCCC secretariat suggested that TT:CLEAR could be used to access some of the information needed to conduct needs assessments such as:

(a) Current and planned national and donor programmes (e.g., GEF Project Map, projects cited in initial national communications of non-Annex I Parties and national communications of Annex I Parties);

(b) Information needed in forming partnerships: identification of businesses and investors interested in projects in a given country, current and planned donor programmes from GEF, some implementing agencies and bilateral development agencies, and experts who can assist in the needs assessment process (TTContacts and UNFCCC roster of experts);

(c) Inventory of mitigation and adaptation methods, models and tools which may be used to carry out technology needs assessments;

(d) Performance, costs and benefits of different technological options (e.g., CADDET and maESTro);

(e) Case studies and lessons learned, compilation of barriers and measures to overcome them, and a database of links to Internet sites related to enabling environments for technology transfer.

28. Many participants suggested that TT:CLEAR could include the results of needs assessment studies carried out so far to make them known through existing technology information networks to potential investors. A further suggestion was to develop matchmaking capacities in the future.

29. It was generally recognized that, for countries which have already conducted technology needs assessments and are in the phase of implementing technology transfer activities, other types of information may be needed:

- (a) Procedures and sources of financing, investment incentives, concessional terms for financing, export credits, banking and insurance information;
 - (b) Training courses, and capacity-building activities, including on enabling environments for technology transfer;
 - (c) Know-how, joint research and development projects and support programmes;
 - (d) Support programmes to enhance networking among regional information centres.
30. One important role for technology information is to provide access to public domain technologies and institutions interested in participating in joint research and/or technology cooperation activities. However, the information on publicly owned technologies is scarce and inconsistent.
31. An important step toward improving the flow of information is to enhance the capacities of existing regional and national technology centres. These centres play an essential intermediary role between providers and users of technology. The challenge remains how to integrate the existing centres for technology transfer into a functional network.
32. Some participants felt that it would be useful to have the information available in TT:CLEAR translated into other official languages of the United Nations.
33. Many small and medium size enterprises and rural users are still unable to access the Internet. Alternative means such as CDs, newsletters and printed materials should therefore be disseminated through national focal points and regional or national technology centres.
34. One proposal was to use a satellite dish technology for providing access to the Internet in remote areas or in countries with poor communications systems. Such a system may be powered by a solar panel and has a capital cost of US\$ 20,000 – 30,000 and operating costs of US\$ 500 to 800/month.
35. Another important point raised was quality control and comparability of information. It was suggested that quality control should be the responsibility of the host country and the network of experts and technology centres can provide it. Quality control of the information can be difficult and demanding, taking into account the diversity of information sources and the need to avoid subjective judgment and filtering of the information.
36. Some participants suggested that, in collecting, analysing and disseminating technology information, there is a need to emphasize more the sectoral approach. Further analyses are needed on specific barriers to accessing information for sectors such as transport, agriculture, waste, industry and forestry.
37. The participants recognized that there is still a poor technical information base in many countries, which seriously affects the capacity for effective identification and selection of technologies. Possible improvements include:
- (a) Information on ongoing and planned technology cooperation projects, including those mentioned in national communications of Annex I Parties and in initial national communications of non-Annex I Parties;
 - (b) Information on technology performances and costs, case studies of successful projects, and analytical tools to evaluate and rank technologies and activities;
 - (c) Information on, and networks of technical experts who can assist countries with the implementation of needs assessments and design implementation of technology transfer activities;

- (d) Information on, and network of businesses and investors and systems to promote business-to-business matchmaking and provide project development support;
- (e) Networks and information tools that can link country technology transfer needs with existing and planned donor programmes supporting the implementation of technology needs assessments by developing and countries in transition;
- (f) Information on methods for assessing technologies and conducting needs assessments and examples of assessments and technology transfer activities implemented by other countries.

D. Role of technology information in multilateral and bilateral donor programmes

38. Many international organizations have active programmes on providing information on environmentally sound technologies and different aspects of technology transfer. Several of these programmes were presented during the workshop.
39. A key element for successful implementation of the clearing house is how to coordinate the technology information activities of Parties, United Nations agencies and other international organizations and establish a means of information sharing. A possible arrangement for focal points and sectoral coverage by different international organizations is shown in annex II.
40. It was suggested that the role of these agencies is to present the case and facilitate cooperation, based on a technology neutral approach. In many cases their focus is on sustainable development and climate change technology projects are often a strong option.
41. The information provided in different donor programmes spans a broad range of issues such as technological options, how to access, finance, install and maintain, monitor and replicate technologies, and national and local situations.

E. Feedback to the UNFCCC technology information system

42. During the workshop, the secretariat reported that TT:CLEAR had started up in September 2001. Since then, some 200 users had registered with the system. It can be noted that the number of users per country is lower for developing countries than for Annex II countries. The registered users have a broad expertise, varying from experts in ministries and private industry to media representatives and students.
43. Many of the comments received related to site functionality and/or the user interface, and they were taken into account in the current version of the system. During discussions and presentations, it was noted that many users were not able to discover alone different basic functions of the system such as the project search engine, although a guideline for testing the system is available for download. This may be an indication that the user interface should be further streamlined to provide simple access to the different functions of the system. Nevertheless, as the system complexity increases, this may also indicate that a user's guide and/or orientation is needed.
44. Since the fifteenth session of the SBSTA, the secretariat has continued its work to enhance and update the inventory of technology cooperation projects, review and update the generic database of mitigation and adaptation methodologies and identify information gaps and potential sources of information and/or cooperation mechanisms for completing this database. The main results of this work were reported during the workshop.

F. Summary of submissions from Parties

45. Five Parties submitted their views on the technology information systems.⁵ One Party, Spain, submitted its views on behalf of the European Community and its member States and eleven other Parties.
46. A summary of these submissions is presented in annex I. Some of the issues included in the submissions were also discussed in various sessions of the expert workshop.

G. Options for establishing the technology information clearing house and networks of technology centres

47. One theme which surfaced in many discussions was, "What is a clearing house?". An information clearing house can offer a structured entrance to information in the Internet. It is thus an interface between users and relevant information scattered in the Internet. It can function as a detailed catalogue service with support for links to technology information. A clearing house can be a central access point, which aims to minimize the duplication of effort through identifying, describing and evaluating information on the Internet. Clearing houses can be online resources providing information and pointers to the most relevant technology information available on the Internet.
48. Most of the participants agreed that providing information is only one of the functions of the technology clearing house, which was seen as more than a web site. In their opinion, the clearing house should:
- (a) Consist of a network of existing information systems, clearing houses, web sites, and networks;
 - (b) Include a network of experts to provide "face to face" assistance and of intermediaries to facilitate the contact between the providers and recipients of technologies;
 - (c) Have a strong "matchmaking" component to help match proposed country actions with donor programmes;
 - (d) Act as a forum for exchanging views, including through workshops and training courses at regional and national level.
49. Participants identified the following key principles and possible pathways for delivering technology information through the clearing house in the context of the Convention:
- (a) Build on existing sources of information and link existing programmes, systems and networks. Avoid repetition and streamline access to information;
 - (b) Ensure that information dissemination is demand driven, flexible and adaptable to national circumstances and tailored to users' needs. Build user ability to judge what is good for their situation; (e.g., communicate, get advice, improve ability, establish their own plant);
 - (c) Train and strengthen focal points and promote exchange of information between real people and national and regional technology centres. Stimulate the involvement of intermediaries;
 - (d) Adopt a decentralized solution but a central entry point, sending users quickly to other sites;

⁵ FCCC/SBSTA/2002/MISC.12.

(e) Stimulate participation of the private sector, which is the custodian of most of the relevant technology information;

(f) Maintain focus by limiting the scope to technologies available for transfer or transferred under the Convention process.

50. A number of participants suggested that the function to be performed by the clearing house should be designed having in mind its possible use. They recommended analysing different practical tasks such as finding information on technical experts, finding a technology, and comparing technologies, and then building capabilities in the system to perform these tasks.

51. Key challenges in implementing the technology clearing house identified during the workshop include:

(a) How to access the relevant information and avoid over-filtering the information?

(b) How to make the requirements identified through initial national communications known to the donor community?

(c) How to design a gateway to such a diverse range of technologies? How to move from information to knowledge?

(d) How to make TT:CLEAR known to a broader audience, including practitioners and businesses. What is the competitive advantage and niche of TT:CLEAR and how to develop it further in this light?

52. Two options emerged from discussions for establishing the technology information clearing house:

(a) Option 1: a centralized clearing house is established under one institution;

(b) Option 2: a virtual clearing house is established by primarily linking and enhancing existing systems.

Toward the end of discussions on this topic, many participants expressed their preference for option 2.

53. Several ideas were put forward by participants with regard to the role and use of networks:

(a) Different types of networks and matchmaking systems were suggested to be linked to the clearing house: networks of experts or practitioners to help assess the information provided and provide "face-to face" support, governmental networks, networks of focal points (on a regional basis), donor networks and business networks;

(b) Many such networks already exist and are functioning well. Therefore, the participants suggested finding the types of service which the clearing house may offer, detecting imbalances between supply and demand of such services and reaching out to those institutions interested in participating;

(c) One possible way to simplify the access of businesses to a technology transfer network is to create an ad hoc, peer-to-peer, network. A proof of concept solution to support such a network was presented by the secretariat. It includes technology data providers, hubs (national/regional centres) and consumers and it provides tools to support the network, including distributed searches of information.

54. Many participants agreed that the private sector can play an important role in supporting technology transfer and matchmaking systems by, inter alia, providing valuable expertise and developing, financing and marketing specific information products.

55. Some of the lessons learned from private sector involvement in technology information dissemination are:

- (a) Business values highly up-to-date information. However, information is not enough and other mechanisms are needed to attract its participation;
- (b) Matchmaking systems between potential consumers and suppliers are warmly welcomed;
- (c) Companies are used to paying for business information;
- (d) One particular barrier is that the language of climate change makes the overall process exclusive to those already familiar with it.

56. One participant expressed concerns as to whether the establishment and management of the clearing house was the most appropriate role for the secretariat.

H. Roles and contribution of Parties

57. Several ideas were put forward concerning possible roles and contributions of Parties to the establishment and operation of the technology clearing house, including:

- (a) Give assistance in updating system information on the projects undertaken to accomplish the objectives of the Convention and the Kyoto Protocol;
- (b) Identify groups of experts and promote the use of the system by these experts;
- (c) Collaborate in identifying the relevant sources of information in their countries;
- (d) Communicate to the system administrator news that could be included in the system (tax incentives, legislative news, excerpts of journals or technical papers, news considered relevant to other Parties, etc). Further discussion is still needed in terms of what could be the cost of providing this service;
- (e) Provide information on methods, models and tools, including those for decision analysis, which may be used to evaluate technological options and conduct technology needs assessment.

I. Role of the secretariat

58. The secretariat was requested in decision 4/CP.7 to develop a new search engine on the Internet and to accelerate its work on development of a technology transfer information clearing house. The decision emphasizes cooperation with the Climate Technology Initiative and other relevant organizations as well as the networking with existing information centres.

59. Some Parties supported the above-mentioned decision on the understanding that the secretariat has a leading role in the current work on the technology information component of the framework. What role the secretariat should have in the future needs to be discussed within the overall dialogue to assign appropriate roles to the various stakeholders in the information system on technology transfer.

J. Possible elements for future work

60. Continue the testing period for TT:CLEAR, and invite the Parties, relevant international organizations, and the private sector to register and test the system further. Collect feedback from Parties on their experience in using the system, summarize the results of the testing period, and report to the SBSTA.

61. Initiate an outreach programme to make the system known and open the information clearing house to a broader audience.
62. Widen the system by connecting TT:CLEAR to a network of regional and national centres (one centre to start with). Identify technology information focal points.
63. Compare information needed to carry out technology needs assessments completed recently with what TT:CLEAR is providing and then assess what else needs to be included.
64. Initiate technology information forums for one or two regions, including a dedicated dialogue to identify centres and networks in the region and provide them guidance on using the system. Learn their needs and identify information gaps.
65. Continue collaboration with relevant international organizations to link the UNFCCC clearing house to existing technology clearing houses, web sites and networks, particularly through the establishment of focal points.
66. Invite Parties to submit their lists of national web sites which may be linked to TT:CLEAR and of technology transfer centres to be included in the TT:CLEAR databases.

Annex I

SUMMARY OF SUBMISSIONS FROM PARTIES

No.	Issue	Possible actions	Remarks
1.	Ensure that clients' needs are met (what needs and users should the clearing house serve?).	- Maintain focus. - Make certain that information on technology transfer is 'user-friendly' so that it is accessible to the widest possible audience - An overview and/or a brief introduction should be provided on the main page of each module. - The table of contents and the instructions for using TT:CLEAR should be available in official languages of the United Nations.	- NO to proposed online clearing house functions rating system - Controversy NO/YES to technology forum. One Party opposes the forum. Another Party considers this a good feature but recommends several forums by user type. Users are recommending forums with a mediator. - Complex tools for decision-making analysis are not necessary in the near future, given limited resources and time. - The technology information system must not be complicated. - Added brief introductions for technology needs assessments, links and methods. - To be added in future versions (already tested with Chinese).
2.	Clarify the structure and functions of the clearing house.	Conduct a full and comprehensive needs assessment of different functions of the clearing house before details of different data sets are finalized or further elaborated. Such needs assessment should focus on both the end-user and the applicable technologies and presentation of the results. In this context, particular attention should be paid to the specific constraints and needs expressed by developing countries. The output of these further needs assessment considerations should then determine aspects of the clearing house structure.	An objective of the expert workshop. It may be analysed further by the Expert Group on Technology Transfer.

No.	Issue	Possible actions	Remarks
		- The clearing house should function as a gateway to existing databases on environmentally sound technologies instead of serving as an information library. - Maintain the clearing house as an agent or broker for information access be kept alive, rather than as an all-encompassing archive.	Implemented through the distributed search engine and the database of links to relevant web sites.
3.	Maximize the use of existing institutions, networks and resources.	- Linkage to and incorporation of, other technology transfer initiatives. - Entrust another organization with the day-to-day management of TT:CLEAR (centralized clearing house).	Request Parties to identify other initiatives to be included in the network.
4.	Recognize the pivotal role of the private sector in the transfer of climate technologies, as identified through the regional consultative process.	- Make explicit that the commercialization of technology is often the optimal method for technology transfer. - Ensure that practitioners/programme managers are able to access the information on technology. Focus on ensuring that these people are aware of this initiative, and other existing mechanisms for technology transfer.	

No.	Issue	Possible actions	Remarks
5.	Build on results of the technology needs assessments.	• Draw upon existing mechanisms such as information made available from national communications and other related national reports and channels (e.g. national adaptation plans of action that will be prepared by least developed countries). • Incorporate a tendering system for projects.	• Will allow potential recipient countries, donor countries, private sector partners and international financial institutions to post competitions for specific projects. This enhancement would enable a competitive process whereby technology providers may bid for contracts and recipients and funding agencies may conduct their own evaluations to select the most suitable bids. • An inventory of mitigation and adaptation methods, models and tools has been added since the fifteenth session of the SBSTA.
6.	Ensure the sustainability of these systems to facilitate technology transfer.	• Establish an inventory of existing methodologies.	• A financial range (with low and high approximations) must be given at the outset. Such an approximation would give Parties a sense of future commitments and project designers an approximate target for future budgeting. Meanwhile, a more detailed financial breakdown for present activities of the technology information system is needed.

No.	Issue	Possible actions	Remarks
7.	Look at possibilities for cost recovery through nominal user fees for private firms.	Nominal charges for the use of some aspects of the system by private sector firms could be levied as a means to supplement current funding for the start-up and to finance maintenance and modifications.	
8.	Adopt a communication strategy and outreach programme.	- Identify national focal points and initiate actions to make the system known in their countries. - Invite centres identified following the SBSTA request to review their information and provide feedback.	
9.	Develop links to national technology transfer facilities.	Invite Parties to provide such links.	
10	Include a "news" module focusing on information related to design and operation of the technology transfer mechanism.		- News on policy changes, project progress, and any activities related to technology transfer. - Brief guidance on and introduction to the latest scientific findings and technological inventions.
11.	Further enhance, on the basis of continuous reviews by users, the information coverage, depth and accuracy.	- Define criteria and methodology for selecting technologies and projects for the databases. - Establish a mechanism for data maintenance and update. - Measures to improve the reliability of data and information sources should be taken into account. A close assessment should be made of the correlation and relationship maintained between information and data from and available to private sector projects and technologies and those led by national and international institutions in the clearing house.	- Reduce complexity by concentrating on technologies available or used for transfer under the Convention. - Include in the system at least one project for each adaptation and mitigation area (EU); - Role of Parties is essential in maintaining and peer reviewing information.

No.	Issue	Possible actions	Remarks
12.	Inventory of technology cooperation projects contains mainly capacity-building activities.	• Coordinate with capacity-building activities under the Convention.	
13.	In order to guarantee that most appropriate technologies are selected from the databases, comparison of technology levels should be made possible not only between technologies in developed and developing countries, but also between advanced and lagged technologies among developed countries.	• Comparison is only possible between [energy] technologies already in the database.	
14.	There is no mechanism for updating the technical paper FCCC/TP/2001/2, but this is necessary for enhancing the design of the clearing house.	• Consider revising the technical paper to include missing elements and enhancements.	
15.	Role of Parties.	• It would be helpful if Parties provide and update the data and information regularly. However, developing country Parties may lack the necessary resources, in which case financial and technical assistance should be made available to them for that purpose.	

No.	Issue	Possible actions	Remarks
16.	Role of the secretariat.	• The framework for meaningful and effective actions to enhance the implementation of Article 4, paragraph 5, of the Convention, stipulates in paragraph 2 the approach required for the successful development and transfer of environmentally sound technologies. It requests the secretariat to develop a new search engine on the Internet and to accelerate its work on the technology transfer information clearing house. It emphasizes cooperation with the Climate Technology Initiative and other relevant organizations as well as networking with existing information centres. • One Party fully supports decision 4/CP.7 on the understanding that the secretariat has a leading role in the current work on the technology information component of the framework. What role the secretariat should have in the future needs to be discussed within the overall dialogue to assign appropriate roles to the various stakeholders in the information system on technology transfer.	
17.	Acknowledge how relevant the access to patent documents is in the context of technology transfer, several links to the most relevant sources of this kind of information could be included in TT:CLEAR.	Some organizations have made available information on technologies free of charge via the Internet by providing access to a large amount of patent documents (which have been scanned and are available in .pdf format). In this way, 30 million documents from more than 50 countries are available (offered free of charge by the European Patent Office).	
18.	Use international patent classification (IPC).	• Classification developed under the World Intellectual Property Organization with approximately 69,000 subdivisions	• Is flexible to accommodate future technologies, exists in several languages
19.	Capabilities of the search engine.	• Uses patent information search engines. • Makes the documents searched from outside databases linked to this information system accessible.	

No.	Issue	Possible actions	Remarks
		• Broader links may be established between the search engine and web sites of more Parties, professional and business societies, non-governmental organizations and excellent research institutions. • In the searching process, the key words are given by the system rather than being entered by users, which is inconvenient for users in many cases.	
20.	Establish national, regional and subregional centres.	• GEF and/or UNFCCC should provide support for such centres.	• These centres will have the role of, inter alia, integrating information, providing feedback, exchanging experience, capacity-building and contributing to establish priorities and policies for sustainable development.
21.	Technology database.	• Link with financial information, policies. • Add an attribute on technology ownership.	
22.	In some countries, there are problems of reliability, security, and limitation of access to the Internet.	• Disseminate the information on technology transfer on CD-ROMs, diskettes, and/or by newsletter. • Investigate technical options and costs for satellite dish connection.	

No.	Issue	Possible actions	Remarks
23.	Side-by-side comparisons of technologies.	• Other complementary tools should also be developed for technology comparison. In this way, the risks of systematic distortions and errors can be avoided more or less. • The development of additional tools, as well as the rationales of side-by-side comparisons and criteria for technology classification, should be further elaborated by the Expert Group on Technology Transfer and Parties.	• It is useful as one of the tools for technology comparison.

Annex II**INTERNATIONAL ORGANIZATIONS: SECTORAL COVERAGE AND POSSIBLE COLLABORATION**

Organization	Proposed 'in house' sectoral coverage	Proposed specific collaboration partnership
Global Environment Facility	Projects financed under the climate change focal area	Projects financed under the climate change focal area
Organisation for Economic Co-operation and Development (OECD)	Focal point for information on official development assistance	Access to climate change data from creditor reporting system
Food and Agriculture Organization (FAO)	Agricultural focal point	Access to information on adaptation technologies
United Nations Environment Programme (UNEP)	Environmentally sustainable technologies for industry projects and processes with particular focus on mitigation technologies	International Environmental Technology Centre (Japan) focusing on environmentally sound technologies for urban and freshwater management
	Technologies cross-cutting with the Montreal Protocol	UNEP - Ozone action
	Energy technologies	UNEP Collaborating Centre on Energy and Environment (according to expertise)
	Networks of technology transfer practitioners	UNEP SANet programme
United Nations Industrial Development Organization (UNIDO)	Focal point for industry-related activities directed at reducing industrial greenhouse gas emissions	UNIDO (Cleaner Production Centres programme)
International Energy Agency (IEA)	Focal point for mitigation technologies in demonstration phase (energy efficiency and renewable) and directory of organizations	CADDET and Greentie
World Health Organization (WHO)	Health focal point	Inter-Agency Network on Climate and Human Health (ICHN) comprising WMO, UNEP and FAO (tentatively)

World Meteorological Organization (WMO)	Hydrological and agricultural focal point (others could be considered)	FAO, UNEP, United Nations Educational, Scientific and Cultural Organization and international agricultural research centres under the Consultative Group on International Agricultural Research
World Bank		Development gateway – access point to many development projects.



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DEVELOPMENT AND TRANSFER OF TECHNOLOGIES

Report of the expert meeting on methodologies for technology needs assessments Seoul, Republic of Korea, 23-25 April 2002

Note by the Chairman

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I. INTRODUCTION

A. Mandate

1. By its decision 4/CP.7, the Conference of the Parties (COP) requested the Chairman of the Subsidiary Body for Scientific and Technological Advice (SBSTA), with the assistance of the secretariat, in consultation with the Expert Group on Technology Transfer (EGTT), to organize a meeting with representatives from governments, experts drawn from the UNFCCC roster of experts, and representatives from relevant international organizations, to identify methodologies needed to undertake technology needs assessments and to report their findings to the SBSTA at its sixteenth session (FCCC/CP/2001/13/Add.1, annex, para.7).

B. Scope of the note

2. This note presents the report of the expert meeting on methodologies for technology needs assessments, held in Seoul, Republic of Korea, in the period from 23 to 25 April 2002. It contains a summary of the meeting presentations and the panel and general discussions, as well as the outcomes of three parallel working groups. The meeting was organized by the secretariat in collaboration with the United Nations Development Programme (UNDP) and with the kind assistance of the Korean Energy Management Corporation (KEMCO) of the Republic of Korea.

3. This note should be read in conjunction with the report of the expert workshop on technology information, held in Tsinghua University, Beijing, China, from 18 to 19 April 2002 (FCCC/SBSTA/2002/INF.6).

4. The expert meeting generated a total of 25 technical presentations, 10 country case studies and fruitful discussions at the plenary and the three working groups. All presentations are available for reference in hard copy and on CD-ROM, as well as through TT: CLEAR on the secretariat's web site.¹

5. The report of the expert meeting was prepared by the Chairman of the SBSTA, with the assistance of the secretariat, in consultation with the Chairman and Vice-Chairman of the Expert Group on Technology Transfer (EGTT). It takes into account presentations by country representatives and experts, and discussions at the meeting. Several ideas on possible methodologies including next steps were suggested in the working groups and the final session of the meeting. With this approach, the suggestions presented in this report are to be viewed as a list of thoughts and ideas that can serve as input to further discussions and considerations by the SBSTA at its sixteenth session.

II. REPORT OF THE EXPERT MEETING

A. Introduction

6. The agenda of the meeting was designed, in consultation with the Chairman of the SBSTA, the UNDP National Communications Support Programme, the Climate Technology Initiative (CTI) and some members of the EGTT, to address issues related to technology needs assessments and other issues identified in previous regional workshops organized under the consultative process for the transfer of technology.

7. The meeting was attended by 60 participants, including 24 from non-Annex I Parties representing Africa (9), Asia and the Pacific (8), Latin America and the Caribbean (6) and small island States (1). Twenty-one representatives from Annex I Parties also participated in the meeting. Ten intergovernmental organizations were represented and one participant from the private sector also attended.

¹ <http://ttclear.unfccc.int/ttclear/Jsp>

8. As co-organizer of the expert meeting, UNDP-Global Environment Facility (GEF) funded the attendance of 11 participants from developing countries and countries with economies in transition. These countries are undertaking their technology needs assessments as part of their climate change enabling activities, funded through the GEF Capacity Building in Priority Areas programme. To assist further the countries in analysing priority technologies, the Global Environment Facility (GEF) unit of UNDP launched a project to develop a handbook for assessing technology needs. The project will involve consultations with Parties and relevant stakeholders, and will facilitate training and capacity-building activities. The handbook is expected to be completed by the end of 2002.

9. The objectives of the meeting were to identify methodologies needed to undertake technology needs assessments and to report the meeting's findings to the SBSTA at its sixteenth session (see paragraph 1 above) as well as to generate and share information on experiences, special situations and needs of countries in different regions and on possible next steps for further consideration by the SBSTA. In particular, the aims of the expert meeting were as follows:

(a) Provide the SBSTA with technical advice on available tools and methodologies in technology needs assessments, taking into consideration:

- The experiences of developing country Parties participating in climate change enabling activities, funded through the GEF Capacity Building in Priority Areas programme;
- Tools and techniques used by bilateral institutions and other international organizations in implementing projects involving technology transfer;
- The need to identify tools and methodologies in needs assessments that would suit the requirements of the Convention;

(b) Identify the different barriers and challenges to conducting technology needs assessments and the means to overcome these barriers;

(c) Discuss the processes and main elements of technology needs assessments consistent with the requirements of Article 4.5 of the Convention;

(d) Recommend to the SBSTA tools, methodologies and processes in assessing technology needs that the Parties may consider in preparing their prioritized needs;

(e) Describe potential follow-up activities after identification of technological needs that may be pursued by the different stakeholders.

10. The secretariat prepared a background paper for the expert meeting.² The objectives of the paper were to provide an overview of the concepts of technology needs assessments and methodologies used by different institutions and to discuss various methodological options for assessing technology needs in support of the requirements under the Article 4.5 of the Convention and the framework for meaningful and effective actions to enhance Article 4.5 of the Convention (decision 4/CP.7).

11. In the course of assessing various methodological options in technology needs assessments, the methodology developed by CTI stood out prominently. The technology needs assessment process described in this report was drawn from countries' expert presentations, including from the CTI technology needs assessments methodology.

² A copy may be downloaded at <http://ttclear.unfccc.int/ttclear/Jsp>

12. This report summarizes the proceedings of the meeting under the following headings:

- Concepts, tools and experiences in assessing technology needs;
- Technology needs assessment process;
- Barriers to the implementation of technology needs assessments;
- Outcome of the working groups: conclusions and suggested possible next steps

B. Concepts, tools and experiences in assessing technology needs

13. The framework for meaningful and effective actions to enhance the implementation of Article 4, paragraph 5, of the Convention defines technology needs assessments as a set of country-driven activities that identify and determine the mitigation and adaptation technology priorities, involving different stakeholders in a consultative process to identify the barriers and measures to address these barriers through sectoral analyses (FCCC/CP/2001/13/Add.1, annex, para.3).

14. The discussion on concepts, tools and methodologies in technology needs assessments was drawn from the experiences of developing countries that are currently conducting needs assessments and from the three methods identified in the background paper prepared by the secretariat. The three sample methods are:

(a) The Climate Technology Initiative methods designed specifically for needs assessments for climate technologies;³

(b) The Environmental Technology Assessment developed by the UNEP International Environmental Technology Centre.⁴ This tool focuses on enhancing urban environmental management;

(c) The national needs assessments developed by the United Nations Commission on Sustainable Development⁵ to define a portfolio of capacity-building actions and technology transfer projects to accelerate the development, adoption and implementation of environmentally sound technologies (ESTs).

15. The participants discussed the different concepts, methodologies and tools on technology needs assessments based on the technical presentations and country experiences. They noted the following general overarching approaches to assessing technology needs:

(a) There are existing methodologies which may serve as a good foundation to build on and adopt in the context of climate change. There is, however, a need to improve these methodologies so as to fit specific national circumstances and to integrate adaptation technologies, particularly in the areas of vulnerability assessments, monitoring and climate modelling. The participants observed that existing methodologies in assessing technologies are specifically designed for greenhouse gas mitigation technologies;

(b) Technology needs assessments should be country-driven and as such, aside from contributing to greenhouse gas emissions abatement and reducing vulnerability to climate change, they should also contribute to the national development objectives such as job creation, poverty eradication and capacity-building, and the broader aims of Agenda 21;

³ Methods and Examples for Technology Needs Assessments and Technology Transfer Implementation, CTI, April 2002.

⁴ www.unep.or.jp/ietc/supportingtools/enta

⁵ E/CN.17/1996/3.

(c) Participation of stakeholders at the outset of the process is crucial to the successful implementation of needs assessments. The experience of some developing countries showed that increased participation of non-governmental organizations, the private sector and academia led to active support and ownership of the identified projects. Active participation of stakeholders also enhances exchange of information and data needed in assessing technologies;

(d) Technology needs assessments is not an end in itself but a part of the technology transfer process, so they should be conducted with clear objectives in mind. Particular attention should be given to the implementation of the action plans defined during the needs assessments to complete the process of technology transfer. The results of needs assessments should be a living document that can be revisited and revised to reflect the latest socio-economic and technological developments;

(e) Technology needs assessments are not only meant to identify technologies for possible donor funding but also to provide multiple benefits at the country level, including the identification of policy gaps leading to improvement of enabling environments, increasing the capacity of local institutions and experts, and raising public awareness of climate change issues.

C. Technology needs assessment process

16. The process of carrying out needs assessments may vary from one country to another due to differences in national circumstances. Case studies show the following common features:

(a) Establishment of criteria: the criteria may be based on market potential, contribution to national development objectives, potential to reduce greenhouse gas emissions, ability to trigger growth in other parts of the economy;

(b) Definition of priority sectors: priority sectors (energy, forestry, agriculture, coastal/marine, etc) and subsectors (industrial, energy efficiency, renewable energy, etc.) are selected and the focus is placed on a few executable measures to maximize the effectiveness of the needs assessment process;

(c) Compilation of technology and market information: collecting additional information about the priority sectors leads to better understanding of technological options and the decision-making process;

(d) Selection of priority technologies: based on the experience of the United Nations Industrial Development Organization, technology choices at this stage may be based on their suitability to local conditions, technical viability, economic/commercial viability, workability, adaptability, equitability and sustainability;

(e) In-depth technology and barrier assessment: the identified technologies are assessed in terms of cost implications, reliability and effectiveness in addressing climate objectives and in identifying potential barriers to development and dissemination;

(f) Definition of alternative actions: this process involves defining alternative actions to address key barriers based on the established criteria. Key decision-makers representing the Government, business and technical institutions are involved in this process;

(g) Selection of actions: meetings with various stakeholders are convened to identify a set of actions for every prioritized technology following the establishment of the criteria and in-depth assessments of technological options. The actions may include developing implementation plans and identifying key players;

(h) Preparation of a needs assessments report: the format and contents of the report may include a description of the process of setting the criteria, selecting priority technologies and proposed

implementation actions. It was noted that the reports should be investor-friendly and policy-relevant to ensure that follow-up actions are implemented.

17. It is important that, in every stage of the above-mentioned process, stakeholder participation and transparency in the process are assured to ensure active participation of different stakeholders, particularly in the implementation of the action plans.

18. The country and technical presentations showed that tools and methodologies are available for assessing technology choices, but developing countries and countries with economies in transition need assistance and training in their proper utilization.

19. The participants noted that technology transfer also takes place under the clean development mechanism (CDM) and in the context of regular private sector transactions. The added value of technology needs assessments is that the results can be used for the implementation of Article 4.5, the CDM and private sector investments.

D. Barriers to the implementation of technology needs assessments

20. The participants identified several barriers to the successful implementation of technology needs assessments, ranging from technical, policy and social to financial barriers. Based on the presentations and discussions, the following barriers to needs assessments were identified:

(a) Stakeholder participation: some of the barriers relating to stakeholder participation include addressing different stakeholder demands, the inability to identify relevant stakeholders and the limited technical background of stakeholders;

(b) Lack of trained national experts: the participants highlighted the need to build local capacity through training, seminars and regular exchange of experiences among experts at the national and international levels;

(c) Lack of coordination: insufficient coordination among national and international agencies and between the public and private sectors was cited as one of the barriers to effective needs assessments. The lack of coordination has affected the effective exchange of information and resources among the different agencies;

(d) Lack of institutional capacity: national institutions have limited capacity to respond to technology transfer concerns. In particular, the participants noted the inability of national institutions to provide the necessary support to identify and prioritize technologies;

(e) Limited access to information: most participants observed that the lack of access to information and databases on adaptation technologies, decision-making tools, methodologies, specific technologies, technical assistance programmes and possible funding opportunities poses a major challenge in assessing technology needs. This includes insufficient information on available resources and the market potential of different technologies;

(f) Availability of instruments and monitoring systems: in-depth analyses of technologies require instrumentation and monitoring systems, which are lacking in most developing countries and countries with economies in transition. Technical assistance from bilateral and multilateral institutions is necessary due to the high cost and difficulty of acquiring these instruments. Further assistance is also needed in training experts for continuous assessments of vulnerability to climate change;

(g) Over-proliferation of methodologies: the participants observed that over-proliferation of methodologies and non-flexibility in terms of utilization of current methodologies are also barriers to assessing technology needs. Countries may have to be selective in choosing from amongst the various tools and methodologies available and adapting these to their own national circumstances;

(h) **Limited funding:** most participants noted the lack of access to, or inadequate availability of, funds for conducting a comprehensive needs assessment. Funds are needed to hire and train experts, to access information and databases on various technologies and to acquire tools and instruments;

(i) **Communicating the results:** communicating the results to the policy makers and the key players such as the business sector and investors was seen as a challenge. To overcome this barrier, it is imperative that the end-users of needs assessments are properly identified at the outset of the project in order to be able to address their concerns.

E. Outcome of the working groups: conclusions and suggested possible next steps

21. The Chairman requested the participants in the three working groups to share and discuss their ideas on possible next steps with concrete recommendations to the SBSTA. Each working group addressed a similar set of issues and questions which had been raised during this meeting and at the previous regional workshops organized under the consultative process on technology transfer. The Chairman of the SBSTA requested the Vice-Chairman of the EGTT, Mr. William Kojo Agyemang-Bonsu (Ghana) to chair the final meeting on 25 April 2002.

22. The framework for action should clearly define the roles of governments and other key stakeholders in both developing and developed countries, including the roles of relevant intergovernmental organizations. The participants recognized that a successful technology needs assessment will encourage the participation of all stakeholders.

23. The various recommendations presented below are derived from the report of the three working groups and the discussions that followed the presentation of these reports to the plenary. The ideas regarding possible next steps are grouped together under the headings: recommendations for the SBSTA and recommendations for possible action by the secretariat and other relevant international organizations.

1. Recommendations for the SBSTA on methodologies for technology needs assessments

- There is no need to develop a new and common methodology for needs assessments since there is no single methodology that is appropriate for all countries. The participants acknowledged that, while existing methodologies each have their own advantages and disadvantages, they provide a useful framework for designing a needs assessment process;
- Improve the current methodologies to include adaptation technologies particularly in the areas of vulnerability assessments, monitoring and climate modelling, and tools for risk assessment;
- Encourage Parties to nominate experts to the UNFCCC roster of technical experts to increase the pool of experts that can be tapped to assist countries in conducting needs assessments;
- Request the GEF, and bilateral and multilateral organizations, to provide funding and technical assistance to developing countries and countries with economies in transition for training and implementation of technology needs assessments;
- Enhance access to technical and funding assistance by establishing a fund for training, conducting technology needs assessments and post-needs assessment work;
- Integrate the results of needs assessments into the national sustainable development planning processes, plans and programmes, such as national Agenda 21s, to ensure that they are relevant and consistent with national priorities;
- Improve coordination of efforts in providing financial and technical support for needs assessments, by linking needs assessment work to existing and planned donor programmes at the country level.

and by helping match proposed actions identified in the needs assessment process to possible sources of donor support;

- Developed country Parties are encouraged to provide financial and technical assistance to developing countries and countries with economies in transition for training, building the capacity of local experts, acquisition of instruments, conduct of technology needs assessments and implementation of follow-up actions;
- Developed country Parties should encourage private sector engagement in needs assessments and in the implementation of action by enlisting international businesses to partner developing country businesses in responding to climate technology market potential and projects and by creating the enabling environments conducive to technology transfer;

2. Recommendations for possible actions by the secretariat and other relevant international organizations

- The participants proposed that the UNFCCC secretariat and other relevant international organizations consider the follow-up activities outlined in this report and assist in making available information on capacity-building programmes, funding and other opportunities for training and seminars;
- The participants also proposed that, instead of using the existing available resources for the development of an in-depth practical approach to technology needs assessments, those resources can be used instead for training on the use of methodologies and tools at the national and regional level, including sharing of experiences among experts;
- The participants proposed requesting the UNFCCC secretariat and other intergovernmental organizations to compile manuals and develop a simple and user-friendly handbook on technology needs assessments that describes existing methods and provides policy makers and other stakeholders with additional references and information on these methodologies. The handbook should be flexible in responding to social, economic, policy and technological changes;
- Access to information is the key to success of needs assessments, and the participants proposed that measures be taken to reduce the gaps between information providers and users. The participants encouraged the UNFCCC secretariat and other intergovernmental and international organizations to widely disseminate information on tools, methodologies and various technologies through the web sites, publications and reports;
- Increase public awareness of climate change and climate technologies so as to invite various stakeholders to actively take part in needs assessments. This will also increase stakeholder ownership of the process so that they can be actively involved in the implementation of action plans;
- Improve access to information on tools and methodologies for needs assessments and information related to specific technologies by exploring other forms of delivery of information such as publications, reports and seminars, particularly in countries where access to electronic mail and the Internet are limited;
- Document the results of needs assessments in developing countries and countries with economies in transition and make this available through the web site and publications.